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MEMBER A.B.C.

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Rock Products
CEMENT and ENGINEERING NEWS

Volume XXVIII — Chicago, July 25, 1925 — Number 15

A Slackline Plant of Excellent Design

Stoney Creek Gravel Co., California, Increases Tonnage Easily by Having a Well Built Plant

THE Stoney Creek Gravel Co.'s plant at Orland, Calif., is rather a model for slackline cableway installations. In addition to this it is an excellent example of how such a plant can increase its tonnage and expand its production facilities, always provided that it buys its machinery with a proper margin of capacity to allow for the extra work involved.

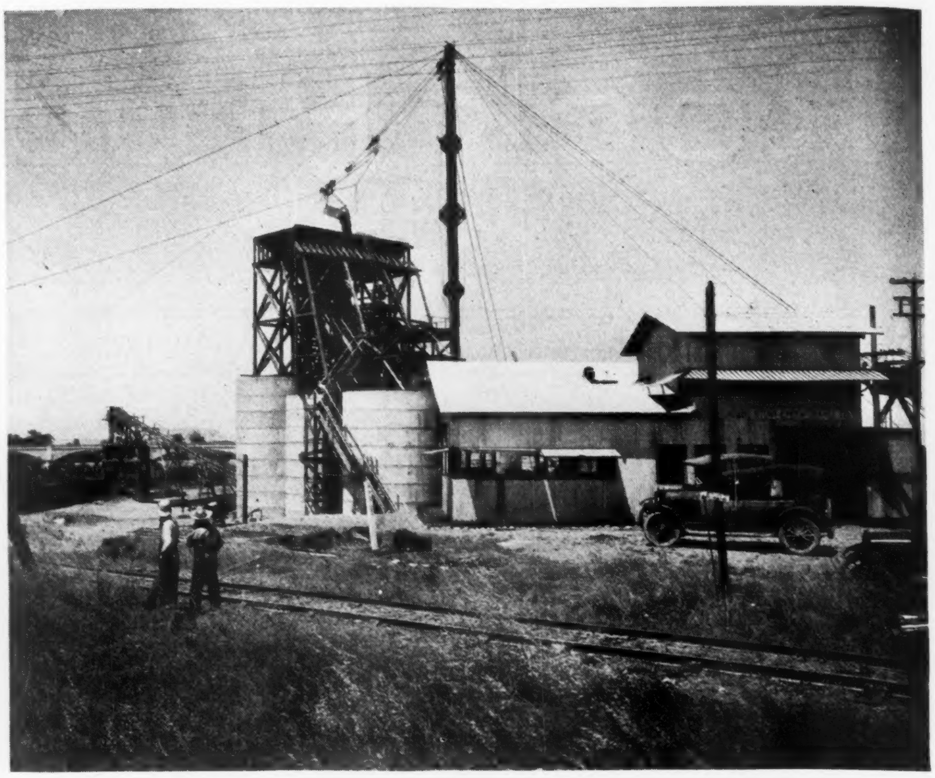
The plant was built last summer and before three months had passed the demand for its product had risen beyond

Stoney Creek Gravel Co.'s plant at Orland, Calif., which is a model for moderate tonnage plants of this type

its producing capacity. This had been anticipated in part when the plant was built. The bins, the screens and the mast had all been built to accommodate twice what the ¾-yd. Sauerman bucket at first installed would produce. It was expected that when the business grew to justify it, a 1½-yd. bucket and a larger hoist would be installed. But no one supposed that this would come to pass for a long time. Consequently when the demand rose suddenly it was necessary to do something quickly and it was decided to depend upon the reserve speed and power which the hoist possessed and install a 1-yd. bucket.

The deposit worked averages 35 ft. deep and contains all sizes from 8 in. "cobbles" down to sand. It is dug over a 750 ft. span. The mast which is erected on top of the bin reaches 122 ft. above the ground, and this gives the bucket a return speed around 1200 ft. a minute.

The hoist, which is a Sauerman Bros. two-speed, two-drum hoist, electrically driven, hauls in the bucket at 750 ft. a minute and digs at 250 ft. a minute. These are the regular speeds for which the machine was designed. It is evident, however, that these speeds are exceeded in practice, for H. S. Twede, the manager of the operation, writes that the bucket has made a round trip in 71 seconds. Working over a 400 ft. span, he says that the bucket can load nine cars in 6½ hours, which figures very nearly 60 yd. per hour, assuming the cars hold the usual 43 yd. Such work with a slackline excavator is excellent. Taking one day with another, however, the average production is 10 cars for a nine-hour day, which speaks well for both the operator and the equipment.



Nearer view of plant showing the setting of hopper, mast and hoist house

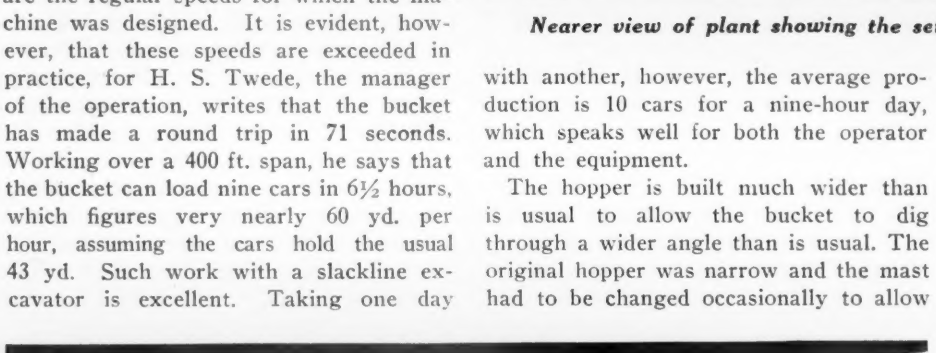
The hopper is built much wider than is usual to allow the bucket to dig through a wider angle than is usual. The original hopper was narrow and the mast had to be changed occasionally to allow the bucket to vary its path. With the new and wider hopper the bucket can dig over a fan shaped area that is 800 ft. wide at the end which is farthest from the plant.

The deposit is a creek bottom and it renews itself each year from the sand and gravel which is carried by the floods of fall and winter. Mr. Twede writes that in most years the area described will produce enough for a season's business and will refill itself in the rainy months so that there will be no necessity of moving the mast at all.

Hopper, mast and screening equipment are all erected on six cylindrical bins made of concrete. The framework that supports these on the bins is of heavy timber, built and designed to withstand the strain and vibration of working. The bins are in two rows of three and there is a line of sizing screens above each row. The bins are each divided by a bulkhead of 4x12-in. timbers, braced and rodded so that there is storage for 12 different sizes of material. Gates of the rack and pinion type regulate the discharge from the bins. This discharge falls on a belt conveyor that takes it to the cars, and by regulating the gates any mixture of sizes may be made.

There is a single screen, apart from the others, for making bank-run material. This allows everything finer than 2½-in. to pass. All screens are driven through clutches so that any set of screens may be run independently of the others.

Sand is recovered in a tank or box in which there is a drag conveyor for pull-



Inside the hoist house. The operator has a full view of the bucket coming in from the field and also of the wide hopper which may be seen through the open door

ing out the settled sand.

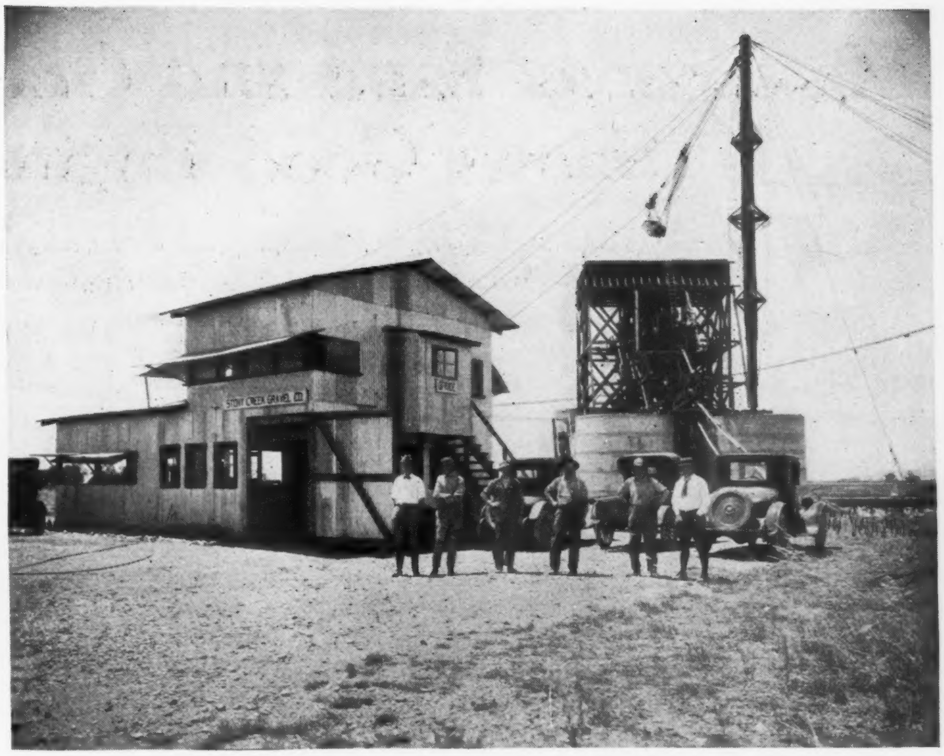
Water for washing comes from a well. This has been sunk to a depth of 133 ft. and it gives an ample supply. A 4-in. pump, which delivers 750 g.p.m., raises the water from the well to the screens.

The oversize of the screens goes to a 9x15-in. jaw crusher. The crushed rock goes through the screens and into the bins below on one side of the plant and the uncrushed gravel goes to the bins on the other side. Just recently a Telsmith reduction crusher has been added to the equipment to crush rock to ¾-in. size.

The company's output has attained a high reputation for making concrete and this, of course, is due to the excellence of the preparation which is given to it before placing it on the market.

The office of the company was formerly at Willows, but has now been moved to Orland, where the plant is. Ample shipping facilities are given by the Southern Pacific R. R., on which the plant is located.

The entire operation uses only four men. One of these operates the slackline cableway from the hoist, one takes care of the washing and screening, one looks after the gates and the conveyor by which the cars are loaded and one attends to the placing of cars.



The hopper is of unusual width to permit the bucket to dig through a wide angle without shifting the mast

Florida State Limestone Report

Reviewed by OLIVER BOWLES

A GROWING recognition of the importance of limestone as a basic mineral product essential to many industries is indicated by the number of recent state reports on the subject. Illinois has just issued a report dealing chiefly with limestone road materials, and a bulletin on the limestones of Pennsylvania is now in press. The latest limestone report to appear is contained in the Sixteenth Annual Report of the Florida State Geological Survey, by Herman Gunter, which includes a preliminary report on the limestones and marls of Florida by Stuart Mossom, published in Tallahassee in 1925.

The mineral production of Florida is confined almost exclusively to the nonmetallics. The total mineral production of the state in 1923 was valued at about $13,250,000, of which phosphate rock constituted $9,000,000; ball clay, fuller's earth, peat, zircon and ilmenite, $1,750,000; lime, limestone and flint, $1,500,000, and the remainder divided between brick, pottery, tile, sand and gravel and mineral waters. The general and statistical part of the reports occupies the first 25 pages and the limestone and marl report the remaining 178 pages. The subject matter was accumulated through 18 weeks' field work during 1924.

A general discussion of limestones, their origin, classification and uses occupies the first section of the report. The second section takes up the origin, texture and structure of Florida limestones, particular attention being directed to their surface and subterranean erosion. This is followed by a somewhat detailed description of the limestones and marls of each geologic formation. The third section comprises descriptions by counties of outcrops and developed deposits, with illustrations of plants and quarries. Many analyses are included, some of them made by the survey and some compiled from other sources. The distribution of workable limestone and marl deposits is shown on a state map. Many of the limestones, particularly in the Ocala formation, are high calcium and of exceptional purity. A general summary gives the actual and possible commercial applications of the limestones, marls and flints. Lime is burned in the Ocala district, but not nearly enough of it for the state's needs.

The chief uses for limestone other than for lime burning are as road material, railroad ballast, riprap, building stone, agriculture and asphalt filler. The Tampa limestone in the Brooksville area is well suited for portland cement manufacture, but no cement industry has yet been established in the state. The limestone industry of the state has recently shown rapid growth with an increase in 1923 of 115% in tonnage over the figure of the previous year. With the exception of some minor errors, such as the designation of $CaSO_4$ as gypsum on page 38, confusion in the second footnote on the same page, and lack of other subheadings following the "crushed flint industry" under the "general summary," beginning on page 190, the publication is creditable and gives evidence of careful and thorough work. The presentation of so much detailed information on the limestones of Florida will be welcomed by those interested in any branch of the industry.

Superior Cement Operating New Aerial Tramway

THE Superior Portland Cement Co., Seattle, Wash., has had constructed and is now operating a new aerial tramway for transporting rock from its quarry to its plant at Concrete, Wash. The aerial tramway is a mile long and is provided with 88 buckets of 1-yd. capacity. It supplants the former method of hauling the rock by rail over a considerably greater distance and extends over the canyons, hills and the Baker river separating the quarry and plant.

John C. Eden is president of the company and the principal offices are in the Seaboard building, Seattle.

Russia Exporting Cement

THE SOVIET UNION has begun to export portland cement, according to advices received by the Russian Information Bureau in Washington. Since January 1 orders have been received abroad for 201,000 bbl., of which 50,000 bbl. had been exported by May 1. The *Trade and Industrial Gazette* (Moscow) reports that the market has proved particularly brisk in the Near East. The product has been of the highest quality, according to the Russian Information Bureau, Washington, D. C. Russia's pre-war exports of cement were insignificant.

Massaponax Sand and Gravel Operation Shows Good Engineering

Profitable Working of This Deposit Involved a Transportation Problem Which Was Solved by the Application of Railway Engineering Practice

THE interesting thing about the sand and gravel industry is the variety of problems it presents. No two deposits are exactly alike and while the practice in certain districts is well settled the same methods applied in another district would spell failure. So to one whose occupation it is to go to plants and study them and write about them there is a considerable thrill when he finds an operation where good engineering and ingenuity have overcome natural difficulties and made a successful business by doing so.

The Massaponax Sand and Gravel Corp., Fredericksburg, Va., has an operation which illustrates this perfectly. Fundamentally the deposit of sand and gravel which it works is an excellent one. The pebbles are all of hard firm rock without a trace of shale or other deleterious minerals. The sand is equally good and gives a very high strength test when made into mortar. But the deposit also presents unusual features and has given those in charge ample opportunity to display their skill and knowledge of engineering.

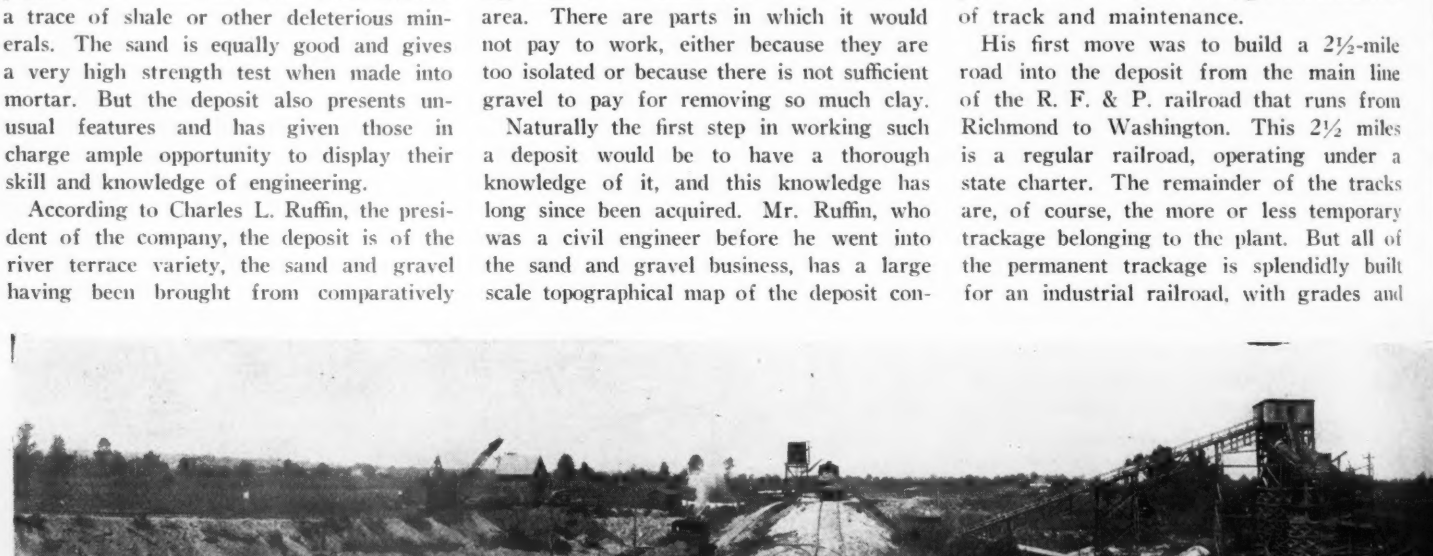
According to Charles L. Ruffin, the president of the company, the deposit is of the river terrace variety, the sand and gravel having been brought from comparatively nearby hills and deposited in an anciently eroded basin in the Aquia formation. The Aquia formation is historical, for out of it were taken the hard sandstones that were used in part for building the White House, the Capitol and other buildings in Washington. The basin in which the sand and gravel is found is only 50 to 60 ft. above tidewater and it is conjectured that at one time it might have been an arm of the sea which is not far away.

The deposit is large but of an irregular shape. In some places the sand and gravel extend to considerable depths and in others the depths are shallow. As always occurs in deposits laid down by water in this way there are lens shaped strata of clay to be encountered occasionally. Hence the working cannot be continuous over the entire area. There are parts in which it would not pay to work, either because they are too isolated or because there is not sufficient gravel to pay for removing so much clay.

Naturally the first step in working such a deposit would be to have a thorough knowledge of it, and this knowledge has long since been acquired. Mr. Ruffin, who was a civil engineer before he went into the sand and gravel business, has a large scale topographical map of the deposit constantly on a drawing table in his office. On this are shown not only the contour lines and other topographical features but the depth and character of the deposit at various places. With this map the work may be constantly planned in advance so that production is continuous and there is no effort lost in working ground that would be unprofitable commercially.

In the next step Mr. Ruffin's training as an engineer also came into play. For he appreciated at once that the working of such a deposit is essentially a matter of transportation. It was necessary not only to provide a cheap and efficient method of getting the bank material to the plant but also to develop a system of tracks that would reach the various parts of the deposit with the lowest charge for removal of track and maintenance.

His first move was to build a 2½-mile road into the deposit from the main line of the R. F. & P. railroad that runs from Richmond to Washington. This 2½ miles is a regular railroad, operating under a state charter. The remainder of the tracks are, of course, the more or less temporary trackage belonging to the plant. But all of the permanent trackage is splendidly built for an industrial railroad, with grades and



This panoramic picture, on two pages, shows the entire operation. On this page is shown the dragline operation and part of the track system by which the bank material is carried above the plant hopper

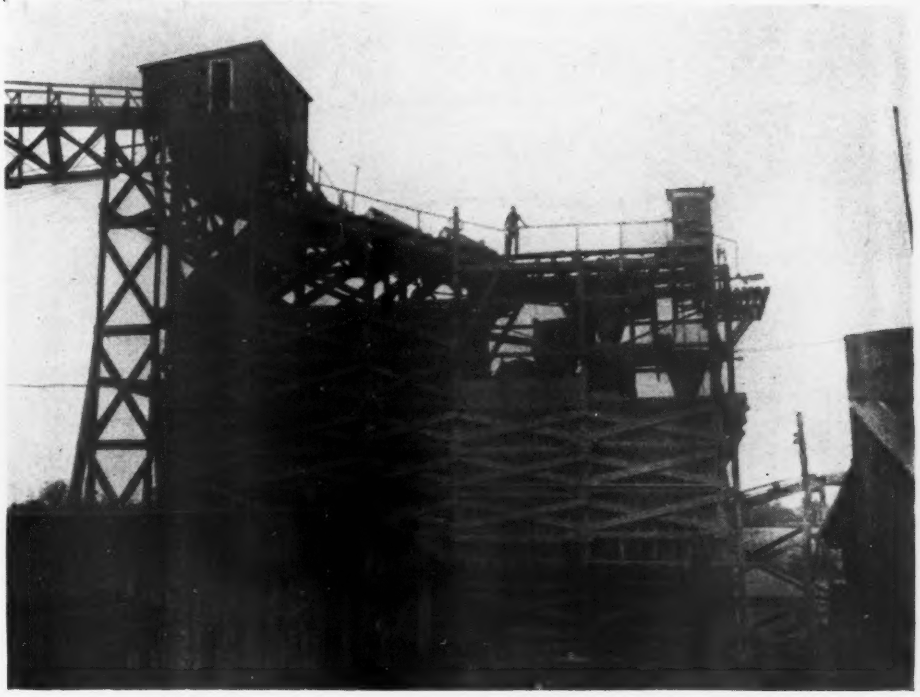
curves carefully worked out, as though it was intended to run passenger trains over them. This pays. The cost of track maintenance is exceptionally low and the long prospective life of the deposit amply justified such an investment.

All tracks are laid with 75-lb. rail. The motive power consists of one 55-ton and one 40-ton American locomotives, one 50-ton Baldwin and a 12-ton saddle-back Porter for switching. All cars are 50-ton standard gage built over to the company's design. There is a machine shop in charge of a regular master mechanic in which every repair can be made to a car or locomotive with the single exception of turning down a locomotive tire. This, of course, requires a larger lathe than it would be profitable to install for the few occasions on which it would be used.

The deposit is worked with two dragline excavators. One of these is a 110-ton Ledgerwood (Class B. T.) with an 80-ft. boom that handles a 2-yd. bucket. The other is a Class 14 Bucyrus machine with a 60-ft. boom and 2-yd. bucket. Page buckets fitted with manganese steel lips are used on both machines.

The cars which are loaded by the dragline have hoppers built above the sills, which are double braced to resist the impact of loading. The top of this hopper is a grizzly built of 75-lb. rails spaced 12 in. This not only keeps out any large pieces of rock and roots and trash but it also helps to break the shock of the load from the dragline bucket. Four car trains are usually run in to the plant.

The plant track comes in on a level below the hopper, on the other side of the hopper from the plant. There is a long easy grade up which the locomotive pulls the loaded cars from this level to the track extending over the hopper. This is all that the locomotive has to do with the train except to pick up the cars on a lower track, the cars running over the hopper in turn and back to the tracks that lead to the draglines by gravity. To accomplish this there are two "humps," the system being the same as that employed in railroad freight yards for distributing cars to the different tracks by gravity.

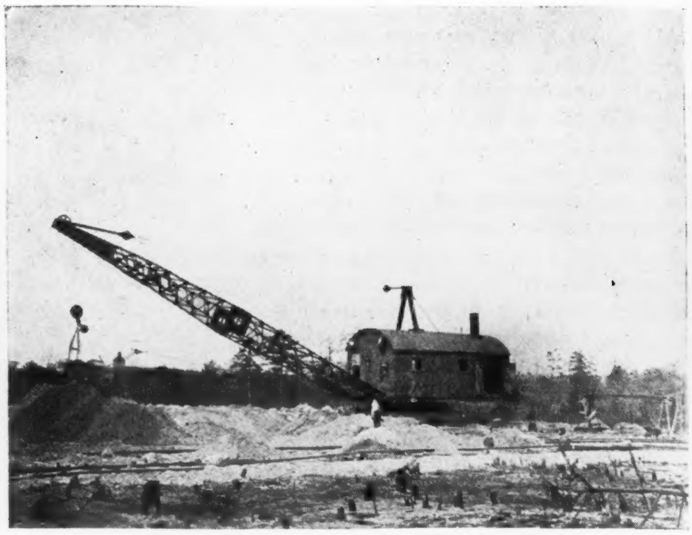


Side view of washing plant. Note the bracing on the bins and the arrangement of the sand cones for double washing

Each car discharges in turn into the hopper which holds several carloads so that trains are not delayed and so that the plant can be kept running between trains. Beyond this hopper is the coal trestle and coal storage, on the same track. Coal can be brought in by the same hopper cars that are used for sand and gravel and unloaded on this trestle. The coal storage is above a track by which the locomotives can be brought in and coaled by gravity.

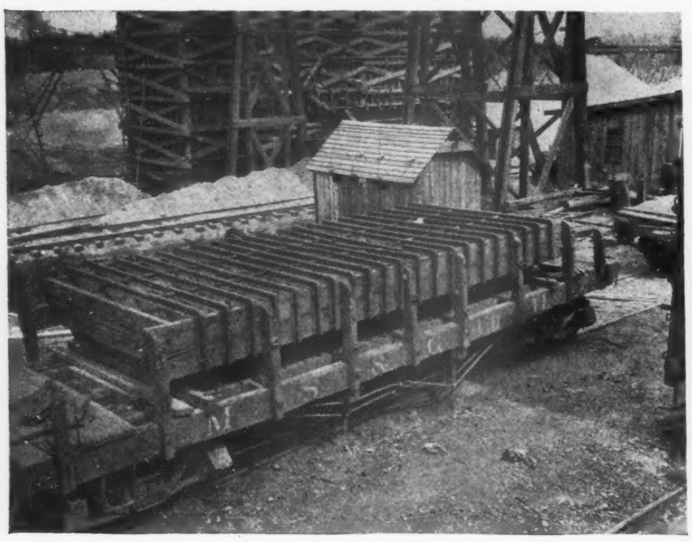
From the hopper the material is fed by a Link-Belt apron feeder to a conical scalping screen with 2½-in. round holes. The oversize of this screen goes down a chute to a No. 4 McCully gyratory crusher, and the undersize to the plant belt which is 30-in. wide and has 200 ft. centers. A short

After passing the hopper the cars return by gravity to a point where the locomotive picks them up. Cars which are to be loaded are brought in on the lower level track shown here. Storage trestle and office building are at the right



Left—A view of the face of the deposit. Right—One of the two draglines opening a new part of the deposit

Left—The other dragline stripping new ground. Right—The pump house which has an upper story into which the motors can be raised in times of very high water

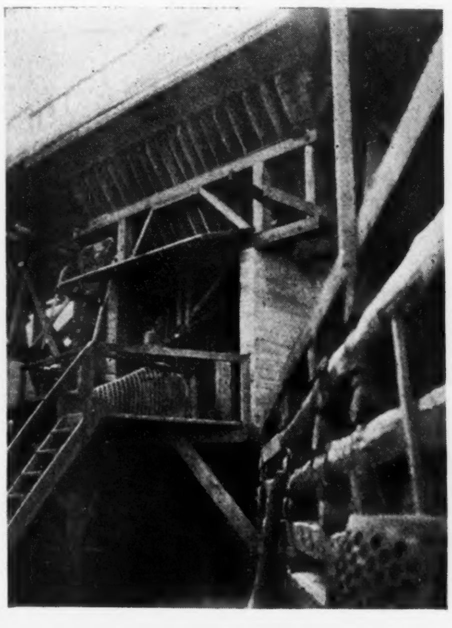


Left—Type of car used. It is rebuilt from the standard car to make it stronger and a grizzly of rails added to break the fall of material. Right—Car above receiving hopper, showing the side away from the plant

Part of the track system below and over the plant hopper

distance from the scalping screen a house is built over this belt and a man sits here and picks off any roots that may escape the man at the feeder who also picks out what roots he sees.

This belt and the long storage belt are of Goodrich Rubber Co.'s Diamond brand and are run at 400 ft. per minute. This is a rather high speed as compared with ordi-



Chute and conical scalping screen below plant hopper

nary practice but the belts are not injured by it. There are no side rollers to keep the belt in line as the structure is rigid enough to insure that the belt stays in line, once the troughing rollers have been properly adjusted.

The crusher discharge is taken by a bucket and belt elevator with close connected buckets and brought to a chute by which it flows to the feeder and the scalping screen. Hence all material must be sufficiently fine to pass the 2½-in. round holes before it goes to the washing plant.

The washing plant, which was completed in 1923, was designed and built by the company. The screens and sand settling cones were taken from an older plant belonging to the company, which was designed by Raymond W. Dull, before he went with the Link-Belt Co. They are practically the same as the screens and cones built by the Link-Belt Co. today. All the plant structure is of southern long leaf pine, 60% heart, which guarantees a long life.

The bins have a peculiar look from the amount of diagonal or "sway bracing" that has been used. Such bracing is not very expensive and it insures the rigidity of the structure when machinery is to be erected upon it. It is a feature sometimes added to bins to stiffen them when they get old, but it would seem to be better to put on the sway bracing at first, as was done in this case.

The plant belt goes into a "head house" or pent house which not only contains the head pulley and its motor but also the controls for most of the motors in the plant. Hence the man in charge of the washer can stop any or all of the motors in case anything goes wrong and this could often be done in time to prevent a serious accident.

There are two lines of screens and the discharge from the belt falls into a divided chute which the men speak of as the "pants legs." There is a double flap valve in this so that either line of screens may be cut out. Each line has a Dull scrubber at the start and three conical screens which have 1¼-in. ½-in. and 9/32-in. perforations.

Each size of gravel falls in to a 100-ton bin, the sides of which are rodded together in the usual way. All the screens are provided with washing sprays so that the gravel is bright and clean when it reaches the bin. The undersize of the 9/32-in. screen goes with the water used in washing to the sand settling and washing part of the plant.

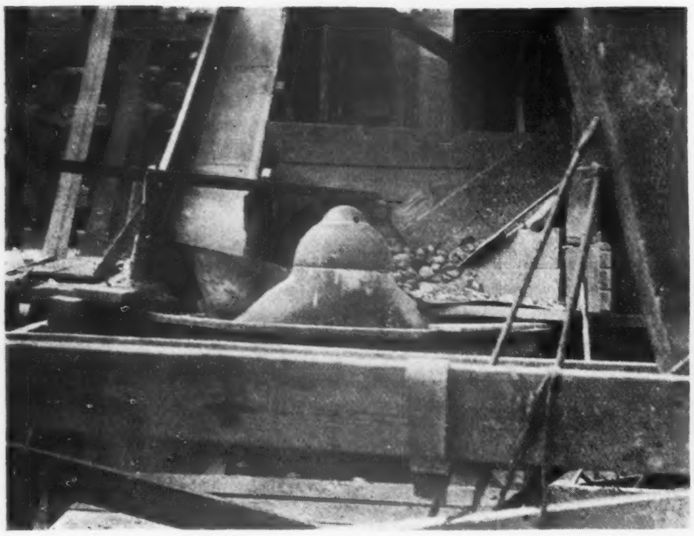
This contains six Dull cones and originally all of these were used. But it was found that so many cones gave more settling area than was desirable so only four are now used, a pair for each screen.

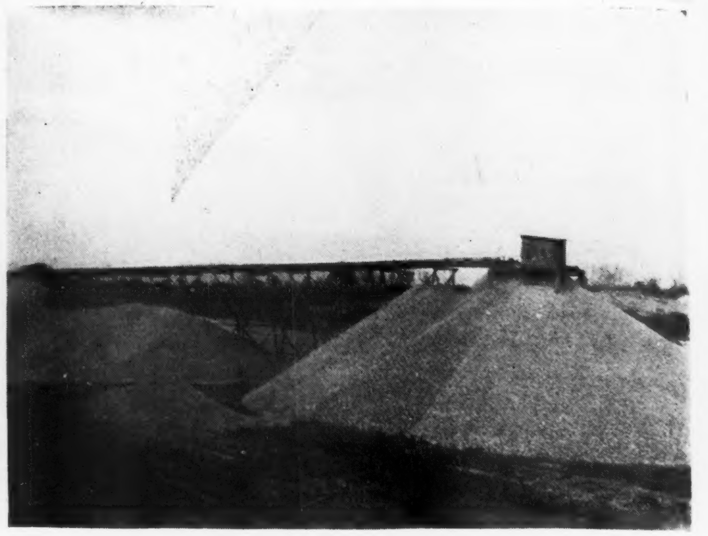
The first of each pair is a dewaterer and gets rid of the clay and unwanted fine sand along with the water. To the eye the sand discharged from this first cone appears clean and bright, but it has to be rewashed on account of the organic matter it may contain. It falls from the cone into a wide trough above which are a number of pipes with small holes. The water issues from these holes with considerable force, breaking up the clots of sand and turning the grains over and over so that each grain is thoroughly washed and rinsed. The Massaponax company claims to put out the best concrete sand produced in Viriginia, and it is on account of the very thorough washing and scrubbing that is given by this system that it is able to make this claim.

Both sand and gravel are put in storage at times. The sand is merely run to storage by gravity, just enough water being

Old canal, dug in Colonial days, which brings water to the plant

added to carry it through the trough. The gravel is taken from the bins by a 26-in. belt with 400 ft. centers which is run by a motor in a small house at the end of the trestle which supports the belt. This motor can be reversed and in this way can be used to move the tripper which discharges the gravel from one part of the storage pile to another, by merely blocking the pulleys of the tripper. This ingenious device was invented by Geo. M. Davis, secretary-treasurer of the company who has also invented a number of other ingenious de-





Left—Arrangement of chutes to the crusher. Right—Storage trestle and stockpiles

vices which are used around the plant, including the system of washing sand described. Mr. Davis is something of a mechanical genius and his skill in that line is quite as evident as that of Mr. Ruffin in the general layout and railroad work.

The water supply of this plant is especially interesting. The water is brought in from the Rappahannock river through a canal which was built by Gov. Spottswoodie, one of the Colonial governors of Virginia. Gov. Spottswoodie had a furnace near the plant and made charcoal pig iron, and the canal was dug to supply this furnace. The old canal required only to be cleaned out and straightened in some places to be ready for service.

The pumping plant has two units each of which consists of an 8-in. Morris pump direct connected to a Westinghouse motor. They are housed in a building of peculiar shape—for a pump house—since it has a high second story above the main building. This is so that the motors may be pulled up above high water level in case of a flood. The pumphouse stands in about the lowest spot on the company's property and on one occasion this ground was submerged. So arrangements were made to pull the motors out of danger as soon as it would be evinent that the water would rise above the pumps. Chain blocks are attached to the motors all the time to have them ready.

The entire plant is motorized except for the digging equipment. All motors are 3-phase, 25-cycle, 440 volts, the current being purchased from a local company. Westinghouse, General Electric and Allis-Chalmers motors are used.

The largest market for the products of the plant as at Richmond, which is about 60 miles away, but there is a considerable call for material for concrete highways and other purposes locally. Highway gravel specifications, it may be worth mentioning, are unusually rigid in Virginia. The state uses a 1-2-4 mix in its roads instead of the 1-1½-3 mix used in many other states. In order to obtain the same strength it is necessary that the aggregate be carefully graded.

The stored material is drawn upon in the peak of the season and is loaded into cars with an Industrial locomotive crane with a 1-yd. bucket.

The main office of the company is at the plant. As the plant is some distance from the town of Fredericksburg the company has a boarding house in which meals are served to both the men and the officers of the company. Charles L. Ruffin, Jr., a graduate electrical engineer, is assistant to Mr. Davis.

Not a Tennessee lecturer on evolution, nor a temperance lecturer, but the silver-tongued president of the National Crushed Stone Association—Otho M. Graves—in action; pleading for the New York state crushed-stone men's endorsement of a bigger, better, more active national quarry association. W. L. Sporberg, president of the New York State association, seated in the background

Sales of Slate in 1924

FINAL RETURNS on slate produced in the United States in 1924 as submitted by the producers show sales of approximately 728,000 short tons, valued at $11,776,016, it is announced by the Bureau of Mines, Department of Commerce. This represents an increase of 3% in quantity but a decrease of 2½% in value.

The slate industry falls into three groups, roofing slate, milled stock, and crushed slate for granules and "flour." The first two groups are closely connected and a strike in some of the quarries in the Pennsylvania district in 1924 materially decreased the sales of both these classes of products. Sales of crushed slate granules, on the other hand, continued to increase as they have done since the beginning of trade in that product.

Sales of slate for roofing amounted to 469,393 squares, valued at $4,626,614, a decrease of 7½% in quantity and an increase of nearly 1% in value. The average value a square was $9.03 in 1923 and $9.86 in 1924.

Sales of mill stock, which includes slate for electrical, and structural and sanitary uses, for vaults and covers, black boards, bulletin boards, billiard table tops, and school slates, amounted to 10,011,180 sq. ft., valued at $3,922,828, a decrease of nearly 10% in quantity and 6% in value. All these milled products decreased in quantity in 1924, except that sold for vaults and covers. The decreased sales of electrical slate were said to be due, aside from the strike, in part to substitution of manufactured material and in part to the use of stone imported for this purpose. Nevertheless the shortage caused by the strike was responsible for increase in the imports of foreign stone.

Sales of slate roofing granules for the surfacing of prepared roofing, and of slate "flour" used as a filler, amounted to 512,810 short tons, valued at $3,178,554, an increase of 11% in quantity and a decrease of less than 3% in value.

Theory and Practice of Lime Manufacture*

Part III—Incomplete Combustion and Loss by Radiation

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

PART II of this series, which was published July 11, discussed the effect of admitting excess air to the kiln. It showed by chart and table the falling off of the production of lime for increasing percentages of excess oxygen, up to the point where the kiln would be running full of red hot rock without producing any lime. In such a case the fuel loss would amount to 100%. In this number Mr. Azbe discusses two other important sources of fuel loss, incomplete combustion and radiation.

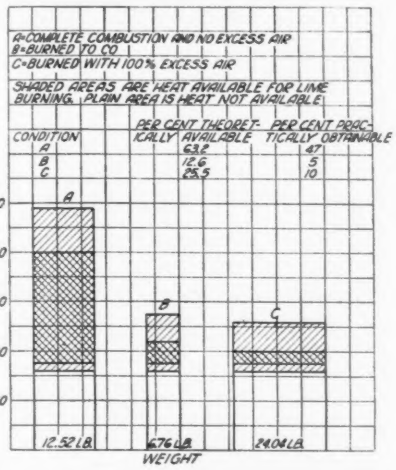


Fig. 5. Diagrams showing the heat available for lime making under different conditions

Incomplete Combustion

When a pound of carbon is burned to CO_2, the resulting weight of gas is 12.52 lb. and its theoretical temperature is around 4800 deg. F. of which all above 1600 deg. F. is available for lime making. Fig. 5 shows in diagram "A" this condition. Horizontal extension means weight of gas, while vertical extension represents temperature elevation possible if all the heat in the carbon were developed before any of it was taken away. The area represents heat. The shaded area represents heat available for lime burning, darkly shaded area represents that used for lime making in a plant where radiation loss is not very great and the kiln is so designed that not a very great temperature head is required in the decomposition zone. When carbon is burned to carbon dioxide, of the heat in the fuel about 47% is utilized by a good kiln. If the same kiln would burn carbon with 100% excess air, still the same amount of heat would be developed but this heat would be distributed over a greater weight as shown by diagram C and only about 10% would be used for lime burning. Why this is so, was explained in the previous chapter.

If, however, one pound of carbon is burned to carbon monoxide (CO) not only the potential temperature elevation will not be acquired, but also the weight of the products of combustion will be less than in the case of ideal combustion. With incomplete combustion in Diagram "B," the darkly shaded area becomes insignificantly small when compared with "A," only about 5% of heat is used for lime making, almost all is wasted. Fig. 6 shows better the effect of burning coal with either too much or too little air. The point of best results is very sharp. Any deviation from this point is heavily penalized, in addition when the kiln is operated with insufficient air the lime will look darker than the case would be when the CO is absent.

When carbon monoxide is found in kiln gases, it is more than likely that other combustible gases are also present, such as methane and hydrogen for example.

Most of the incomplete combustion is due to the volatile matter in the coal and irregular combustible gas evolution. The Bureau of Mines' contention is that air passing through incandescent fuel bed 3 in. thick is fully satisfied with carbon. If no air is admitted above the fuel bed and the thickness is greater, incomplete combustion will be the result. In ordinary practice, additional air always enters the furnace around the firing door and through thin burned-out spots in the fuel bed. Generally, this air is sufficient and quite often more than sufficient. Under certain conditions, however, it becomes insufficient. A hand-fired grate will pass a much greater amount of air immediately after it has been cleaned, when there is no ash accumulation on the grate and the fuel bed is thin, than after a time when there is ash and clinker accumulation, to obstruct the air passage. As a result, after a time there may be incomplete combustion due to insufficient air. A hand-fired grate also works on two different principles, that of a gas producer and that of a gas retort. Immediately after the coal is thrown on the grate, both principles are active—the carbon on the grate being driven off according to gas producer principles and the volatile matter according to gas retort principles.

From the above, the conclusion will be formed that if there is insufficient air and consequent incomplete combustion immediately before putting a fresh charge of coal on the fire, the incomplete combustion will be much worse after the coal is put on, and gas is being driven off which cannot find air to burn with and in consequence escapes unburned. Under these extreme conditions, all of the gas in the volatile matter which may contain 35% of the total heat in the coal, will escape unburned.

It, however, is not often that conditions are such that almost all the combustible gas from volatile matter escapes unburned. As a rule, it will be found that right before firing too much air is used and right after firing too little; but since one is as bad as the other, a heat loss of 35% of the fuel due to irregular evolution of heat and unproportionate air supply, is common.

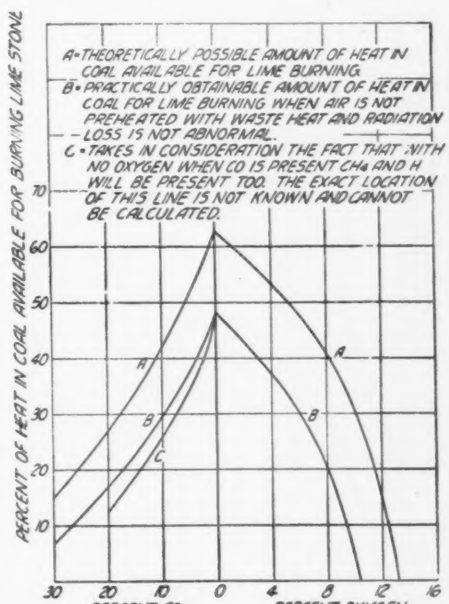


Fig. 6. Diagram showing heat available for making lime with varying percentages of oxygen and CO_2

The volatile matter after being evolved from the coal consists mostly of hydrogen and methane, and to a certain smaller extent carbon monoxide, or roughly in about the following proportions:

*From a paper read before the National Lime Association Convention, May 28, 1925.

	Approximate Combustion by Volume	Approximate Relative Heat Content
Methane—CH_4	28.15	61%
Hydrogen—H	53	34%
Carbon monoxide—CO	6	5

Methane is the most valuable from the lime kiln standpoint. Burned under proper conditions, it will give a long, mild, luminous flame, very effective for lime burning, easy on the kiln refractory and of high radiant heat capacity. With insufficient air, methane will however, break down into hydrogen and soot, the reaction being $CH_4 = C + 2H_2$, instead of $CH_4 + 2O_2 = CO_2 + 2H_2O$, with the resulting dense smoke.

Steady evolution of combustible gases from the coal and proportionately constant supply of air is one of the most important problems the lime man has to solve if he wants high efficiency. The gas producer solves it, but then it has other drawbacks that can seriously harm, and which will be discussed.

Heat Loss by Radiation

The serious effect of heat loss by radiation from a gas producer, flues, furnace, burning zone of kiln and upper zone of kiln was already shown in Fig. 2. The heat generated can be divided into that which will make lime and that which will not. All of the heat lost by radiation from the burning zone clear back and including the producer, is the heat that would all have been available for decomposing $CaCO_3$ or $MgCO_3$. If the heat lost were estimated and the resulting figure divided by 1378, it would give us the loss in pounds in case of CaO and divided by 977 in case of MgO.

The actual loss of heat is more than the heat lost by radiation because to make up for loss of heat of high temperature elevation, the corresponding amount of heat of low temperature elevation cannot be utilized and to make up for it additional coal has to be burned; part of the heat thus developed becomes available and part is lost. Consequently, the loss for every B.t.u. of heat radiated from a gas flue or furnace, is actually two B.t.u., one radiated and one wasted on top of the kiln.

Since heat means gas volume and since kiln capacity for moving gas is limited, it becomes apparent that loss by radiation reduces kiln capacity with the same amount of draft available. That is, it reduces capacity more than it would be apparent from the amount of heat loss.

Insulation Necessary

This all makes imperative that the lime plant be so designed that heat loss by radiation will be at a minimum, either by having little radiating surface exposed, or having it thoroughly insulated. This applies to zones containing heat of high temperature elevation; the insulation of the preheating zone is of no importance since there is more heat available for preheating than is required.

Supposing we assume a gas flue from producer to the kilns 4 ft. in diameter and 100 ft. long, lined only with 4½ in. of brick and containing gas at an average temperature of 1000 deg. F., the heat loss by radiation will be 1,000 B.t.u. per sq. ft. per hour; the total surface will be 1255 sq. ft. So the loss of heat radiated will be 1,255,000 B.t.u. per hour. Since an equivalent amount of heat is wasted on top of the kiln, the loss will be twice this, or, 2,510,000 B.t.u. which in a day's time amounts to 2.4 tons of coal and in addition a loss of 11 tons of lime directly and a certain amount indirectly due to crowding of the kiln with the ineffective gas.

If this same flue would in addition, have 4½ in. of effective insulation, then the loss would be only about one-fourth of the above.

EDITORS' NOTE

THE interest which the publication of these papers has aroused is considerable and it is due to the fact that Mr. Azbe has explained the theory of lime manufacture in a logical manner and in as simple a way as is possible with so highly technical a subject. The editors again extend to the readers of this paper the invitation to ask whatever questions they wish answered in order to make the articles more clear and informative to them. Answers to questions which have been asked on Parts I and II have already been published. Read in connection with the text they serve to elucidate points which apparently were not quite clear to the questioner and hence they form a valuable addition to the text.

Of even greater importance than questions are comments from those whose experience and observations in lime manufacture lead to other conclusions than those arrived at by the author of these articles, and we are sure that Mr. Azbe, no less than the editors, would welcome the publication of letters from those who do not agree with him on every point.—The Editors.

QUESTIONS AND ANSWERS

Questions

1. If I understand your article in the July 11 number of Rock Products (Part II of the series), the reason why there is a high fuel loss when excess oxygen is present in the combustion is merely that heat is wasted in raising the temperature of the excess air admitted to the furnace. Is this correct?

2. From the chart given as Fig. 3, one would judge that you fix the limit of production at about four tons of lime per ton to 12,500 B.t.u. coal, allowing for the usual losses by radiation and incomplete combustion. Are there not conditions under which this production may be exceeded?

Answers

1. You are correct. The heat is absorbed by the excess air at such a rate that the temperature affected by the coal burning is lowered and your flue gas loss increased. If the excess of air becomes great enough, as stated by Mr. Azbe, the temperature in the kiln becomes so low that the limestone will undergo practically no decomposition.

2. Under the conditions considered, namely a temperature head of 150 deg. F., radiation and carbon-in-ash loss of 25%, using a fuel of 12,500 B.t.u. per pound value, about four tons of lime per ton of coal is maximum production. In actual practice conditions are sometimes better and in some cases worse so that different yields are obtained. Under ideal conditions of no radiation and flue gas losses and complete combustion with no excess air, the ratio of 9.27 to 1 is maximum for a coal with a heat value of 12,780 B.t.u. per pound. Naturally this yield is impossible in practice and serves only to represent the absolute maximum under hypothetical ideal conditions. Refer to page 46, Rock Products for June 27.

Specification for Lime for Water Purification

CIRCULAR No. 231 of the Bureau of Standards giving recommended specification for quicklime and hydrated lime for use in the purification of water has been issued.

Lime is used alone or with iron sulphate or aluminum sulphate to produce a precipitate which assists in the clarification of the water and in the removal of bacteria by filtration. Lime is also used either alone or with soda ash for softening the water. For these purposes quicklime should contain at least 90% available lime and hydrated lime at least 90% available calcium hydroxide.

Additional copies may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents per copy.

Government Asks Rehearing of Trade Association Cases

THE government has formally filed petitions with the Supreme court for rehearings in the cases of the Cement Manufacturers' Protective Association and Maple Flooring Manufacturers. In its petitions the government specifically accepts the tests of legality of the trade association activities as laid down by the court, but contends that the records establish their activities as outside the limits defined by the court.

Important Problems in the Lime Industry with Special Reference to Ohio*

An Investigation Made During a Tour of the Lime Producing Districts of Northern Ohio

By Oliver Bowles†

THE WRITER has recently completed a very interesting tour of the lime district of northern Ohio where, through the very cordial co-operation of lime plant operators, he was permitted to make a brief study of problems now confronting the industry. Some of these problems are local in character, while others are common to many districts. As the Bureau of Mines has been making special studies at lime plants for the past three years, it is desired to discuss briefly some of the outstanding problems, particularly in their relation to conditions now existing in the Ohio district.

Northern Ohio is the home of hydrated high-magnesium finishing lime, which is produced in thousands of tons. This lime has won a high reputation and finds a wide market. Fig. 1 is a general view of a typical modern Ohio lime plant producing over 500 tons of lime per day.

The rock from which the lime is made shows little variation either in chemical composition or in physical properties throughout the entire district. This uniformity in rock conditions is favorable for comparison of the various methods and types of equipment in use in the district, for it permits one to judge with a fair degree of accuracy their relative virtues or failings.

Two distinct methods of handling rock are followed: sledging followed by hand loading of kiln stone, and steam-shovel loading combined with mechanical crushing and screening. The former method, as illustrated in Fig. 2, permits better selection and a smaller proportion of fines, though the cost is usually high. As shown in Fig. 3, the hand-loading method requires complex trackage to provide a large number of working places. The steam-shovel method, as illustrated in Fig. 4, requires fewer men and therefore involves a lower production cost, but through the necessity of using mechanical crushers the proportion of fines is relatively high.

Present Demands Require Highest Quality

It is noteworthy that keen competition and more exacting requirements of the consuming trade are constantly demanding greater refinements in manufacture. Slightly defective lime that found a ready market a few years ago would be rejected today. This demands more careful manufacture, which is reflected in cleaner stripping, more judicious selection of stone and better control in burning and hydration. Lime-burning is becoming more of a science, whereas formerly it was a mere rule-of-thumb operation. Fig. 5 well illustrates modern progress and expansion, the 40 kilns of the U. S. Gypsum Co. at Genoa, Ohio, the largest battery of kilns in the world.

Naturally, the first step in a movement toward the application of scientific principles to the manufacturing process is a compilation of data on reactions, thermal effects and physical changes in calcination and hydration. A great difficulty is at once apparent, for unfortunately there are many gaps in our knowledge of the physics and chemistry of lime-burning. Just as with several other important non-metallic mineral industries, a rapidly growing industrial need has demanded production, and more and more production in consequence, of which the mechanical processes of manufacture have far outstripped the research and investigation that should logically accompany each step of progress. Thus normal progress in scientific industrial development is retarded through lack of fundamental knowledge.

Use of Steam Under Grates

For example, a jet of steam beneath the grate is employed in most direct coal-fired lime kilns, and an inquiry into the action of steam brings various replies. Some claim that it protects the grate and prevents clinkering, others that it produces a longer, mellower flame; that it distributes the heat better, preventing local over-burning and protecting the arches from excessive heat; that it assists the combustion of carbon monoxide, thus giving better fuel efficiency; that it increases the draft and increases kiln capacity; that it reacts with the incandescent coal to produce combustible gases, and that it actually assists in the chemical reaction of removal of carbon dioxide from the stone.

Some men connected with lime plants have been bold enough to state that the seeming advantages of a steam jet are pure fiction, that lime of equal quality and quan-

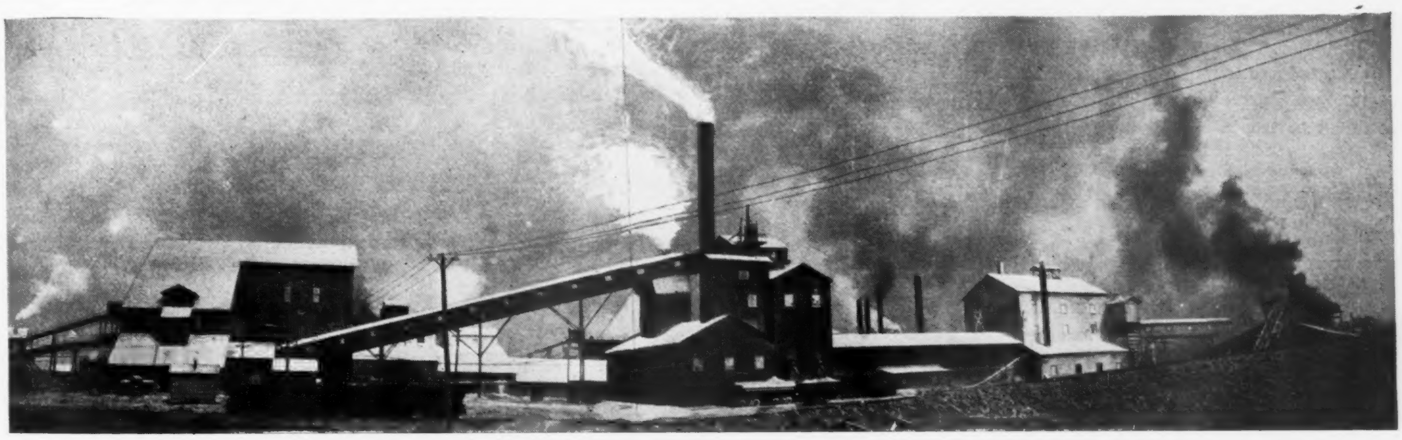


Fig. 1. Plant of the Kelley Island Lime and Transport Co. at White Rock, Ohio

*Published by permission of the Director, Bureau of Mines.

†Superintendent, Nonmetallic Minerals Station, Bureau of Mines, New Brunswick, N. J.

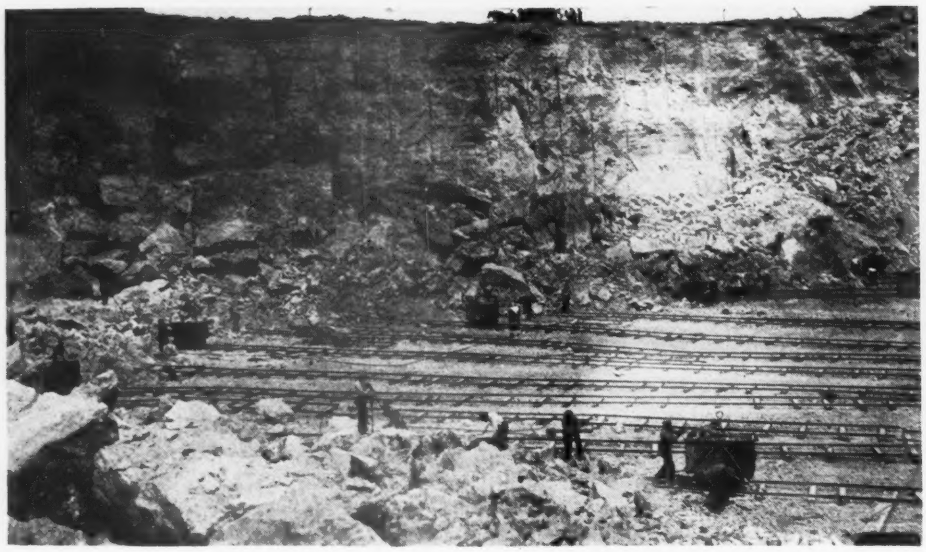


Fig. 2. Hand loading of kiln stone in an Ohio quarry

tity could be produced without steam. If such is the case, what a tremendous waste is involved in the maintenance of steam boilers of several hundred horsepower capacity at many lime plants simply to provide steam for the jets! As the method is almost universal and has been employed for many years, the burden of proof seems to uphold the contention that steam is an actual advantage, but in just what way or ways it is advantageous remains a beclouded issue in the minds of most lime operators. Another problem, the solution of which would undoubtedly assist in working out calcination problems of high magnesian stone, is the exact relationship of the calicum carbonate and magnesium carbonate in the rock. Do they form an isomorphous compound, a mechanical mixture or a solid solution? Some investigators have claimed that all these forms occur in nature.

Fig. 3. Radial track arrangement for hand loading of kiln stone

Problem of Over-Burning

The theory of over-burning is also somewhat hazy. Over-burning of an impure lime may bring about a chemical combination of the lime with the impurities, but even a pure lime may be over-burned. Is it merely a change in physical character, an increase in density, that makes it slow slaking, or does some chemical reaction take place? Is it comparable with the dead-burning of dolomite or magnesite? The factors governing plasticity and possible methods of increasing plasticity might also be cited.

Research work by the Bureau of Standards is giving light on some of these subjects, also fellowship research organized through the activities of the National Lime Association and direct work by the association itself, though the latter has to do mainly with problems of utilization. Much more extensive investigation must be carried out before sufficient data are at hand to form a logical basis for the application of scientific principles to every phase of lime manufacture.

Properties of Limestone and Lime

The relation of the origin and physical properties of limestone to the finished lime is another problem that has scarcely been approached. It is well known that limestones of practically identical chemical composition will produce limes differing entirely in physical propertes. For example, why is it that dolomitic limestones of northern Ohio make excellent hydrated finishing lime, while stones of very nearly the same chemical composition from some other localities make limes low in plasticity and quite unsuited for finishing hydrate? The question has not yet been answered. Possibly an answer to this and similar questions may be found in the nature of the fossil remains from which the limestone has originated, or in solution and redeposition of part or all of the original shells. It may be due to the nature and extent of recrystallization, to the way in which the calcium and magnesium carbonates are combined, or to the presence of small percentages of foreign minerals.

Fig. 4. Steam shovel loading limestone

Use of Spalls and Screenings

An outstanding problem in northern Ohio, as well as in many other lime districts, is the utilization of fines or spalls. This prob-

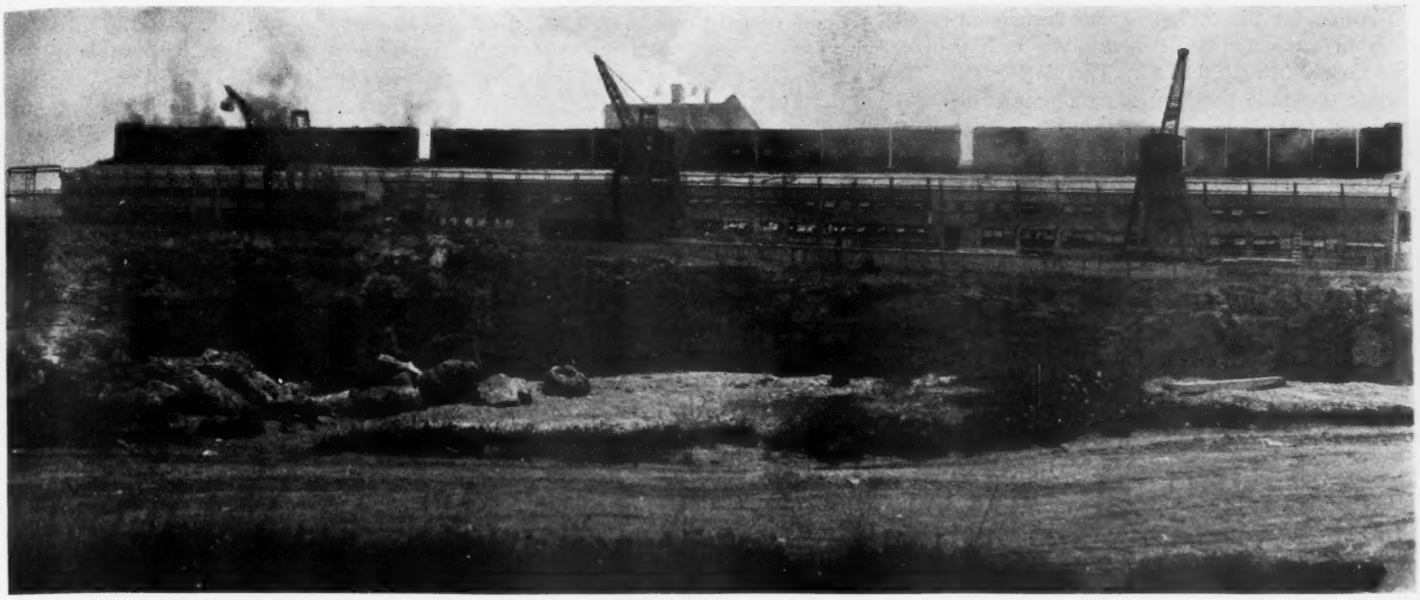


Fig. 5. The largest battery of lime kilns in the world, at the United States Gypsum Co.'s plant, Genoa, Ohio

lem assumes unexpected forms in some regions. Lime industries are known to have grown up for the express purpose of utilizing spalls from other industries. For example, the Vermarco Lime Co. of West Rutland, Vt., operates two rotary kilns to burn marble waste into lime, and rotary kilns at Buffalo, N. Y., utilize fines from the extensive metallurgical limestone quarries of Rogers City, Mich. On the other hand, many lime companies have utterly failed to find a profitable outlet for the fines from their own plants.

Occasionally a combination of lime and cement industries works to advantage as at Union Bridge, Md., where stone selected for size and quality is burned to lime, and all fines are utilized in the cement kilns. In the dolomite limestone districts of Ohio, however, such a combination is impossible, as stone with a high magnesium content cannot be used as a constituent of portland cement.

There is a limited outlet for small-sized stone from the Ohio lime plant quarries in metallurgical works, and as crushed stone and sand, but for the most part the price obtained barely pays the cost of production, in many instances falls below such cost. This return is regarded as so unimportant at some plants that the gross production cost is charged to the lime plant, and the income from byproduct stone regarded as so much clear profit.

A few companies have installed rotary kilns to calcine the fines into lime. Fair success has been attained, but the heavy investment, low fuel ratio, difficulty of manipulation and high cost of relining are disturbing factors that arouse considerable doubt as to whether the rotary kiln is the ultimate solution of the problem.

The more lime plants one visits the more he is impressed with the magnitude of this problem. The proportion of gross production of materials too fine for successful use in the shaft kiln in the Ohio district varies from a minimum of 15% to a maximum of 60%, with an average of at least 40 or 45%. The minimum is attained in quarries where careful blasting is followed and where the rock is sledged and hand loaded. Even with the most careful handling, the nature of the rock in very few places permits a percentage of fines as low as 15. The maximum percentage is obtained where the rock is passed through crushers and screened. Where this method is followed a percentage of fines lower than 40 can hardly be expected.

Great Waste Piles of Good Dolomite

At a number of the hydrated finishing lime plants in northern Ohio the production of fines reaches several hundred tons per day, while a rough estimate of the entire district gives a total of approximately 4000 tons of small stone per day that may be considered a byproduct of the lime industry. The accompanying illustration, Fig. 6, shows one pile of approximately 100,000 tons of pure dolomite limestone under 4 in. in size, and piles of even greater magnitude have been noted. These heaps represent unutilized material. Of course thousands of tons are sold as crushed stone and flux, but the prices obtained range only from 35 to 90 cents a ton, or an average price that probably falls a little below the cost of production.

Competition with Crushed-Stone Producer

If crushed stone is thus sold at a loss, the question will naturally arise, how can a crushed-stone operator exist? An answer is supplied through the fact that the man who operates solely as a crushed stone producer counts on a heavy tonnage with the most economical handling. The lime man is not, as a rule, equipped to produce crushed stone at low cost, for he is dealing in a higher priced product that requires more careful selection and handling. Many lime producers use hand-loading methods, and thus the fines must be hand-loaded also, a method which no crushed stone operator could hope to follow with profit, while each ton of crushed stone brings only a few cents. Finishing hydrate of lime on the

Fig. 6. A pile of 100,000 tons of pure dolomite which has been thrown to waste

other hand brings $10 to $12.50 per ton, or, allowing for the carbon dioxide lost in calcining each ton of stone, gives a lime product worth $7.50 to $9. Therein lies the great economic problem. Can a process be devised whereby stone that sells for 35 to 90 cents a ton may be profitably manufactured into a product that sells for more than 10 times as much? Such stone possesses the purity and all the other excellent qualities of the stone now used for lime. Its only failing is the purely physical one, lack of sufficient size of the fragments. Problems seemingly of much greater difficulty have been solved in the past, and I yet hope and expect to see the day when practically all of the high grade stone produced at lime plants will be made into lime, leaving the production of crushed stone to the professional crushed stone operators.

Does such a prospect seem too visionary for the average lime producer? If the same intensive study that has been applied to flotation, gravity concentration, blast furnace practice and other branches of metallurgy had been directed to limestone calcination I am confident that the problem would long ago have been solved.

Decreased Activities of French Lime Industry

Vice-Consul William W. Cocoran
Boulogne Sur Mer

THERE was a noticeable slackening in the capacity production of the French lime industry during 1924, as compared with its great extension during 1923 and other years immediately succeeding the war, according to statistics recently made available by the National Association of French Lime and Cement Manufacturers.

The present capacity production of French lime manufacturers, according to these statistics, amounts to 3,976,090 metric tons annually, or an increase of 145,475 tons over that of 1923. This is much less than the increase noted in preceding years, 1923 showing an advance of 631,315 tons over 1922. Since the end of 1924 no increases have been noted. The total capacity production, including hydraulic, extra-hydraulic and "clayey" lime, amounted to 3,199,300 tons in 1922 and 3,830,615 in 1923.

Prices for all limes have remained practically stationary since 1923, according to manufacturers in the Pas-de-Calais region, where a great quantity of the country's chalk, lime and cement is produced. Ordinary hydraulic lime is selling for 65 francs per metric ton on wagon at the factories, while extra-hydraulic is bringing 68 francs. (The present Franco-American rate of exchange is 18.9 francs to the dollar.)

The importation of ordinary lime into France has increased from 161,692 tons in 1921 to 379,347 in 1924, but that of hydraulic lime, which reached 639,689 tons in 1921, has decreased since 1922 until in 1924 it amounted to only 479,208 tons. varied only slightly, attaining the high The exportation of ordinary lime has point in 1922 with 23,667 tons and amounting to 16,993 tons in 1924. The exportation of hydraulic lime increased up to 1923, when it reached 270,359 tons, but in 1924 declined to only 104,980, a smaller total than for any of the three preceding years.

The Union of Belgium and Luxemburg supplied most of the imported lime in 1924—362,476 tons of the ordinary and 466,362 of the hydraulic. Most of the exported lime of both kinds went to Algeria, and the next largest consignments to Tunis, Morocco, Senegal, Egypt and the Saar.—*U. S. Consular Reports.*

Making Cement and Burned Lime from Burning Oil Shale

PATENT No. 1,536,165, May 5, issued to Oscar Tetens, Oberlinghausen, Germany, describes methods of burning oil shale to produce hydraulic cementing materials and also burned lime. The specifications contain the following description of the process:

"Bituminous schists, bituminous earths, oil shale, and the like are mixed and burned with limestone and its equivalents; and bituminous limestone rock can be mixed with siliceous earths and burnt.

"After the burning process, and either immediately, or after slaking the lime, a separation of the lime from the burnt shale is effected, whereupon the latter is mixed with substances imparting setting qualities, pulverized and made into a mortar-forming material.

"The ingredients of the two constituents of the burnt mixture may, for instance, be separated by using shale and limestone of unlike granulation. This mixture, which for example, may be constituted of coarse limestone and fine bituminous shale, or of coarse bituminous limestone and finer silicates, is burnt without additional combustibles by utilizing the latent energy in the available schistose coke; the oil is recovered, and ultimately the residue from the burning process is separated out by sifting.

"After the burning process the limestone may be reduced to a smaller size of grain by storing the burnt material for a prolonged period in the open air, or by carefully moistening it with water. That is to say, it is slaked under great precaution. In this way the lime may be easily separated from the shale, and, in the next stage, if found necessary, can be fully slaked.

"The bituminous shale, after the lime-burning process is ground together with substances imparting setting qualities. Such a vivifying substance may be the slaked lime obtained in the process; but burnt or slaked lime from other processes, cement, or gypsum and the like may be used.

"A further mode consists in mixing the burnt or slaked lime, obtained from the method heretofore given, with pulverized raw shale. This mixture is briquetted, burnt with recovery of oil and without additional combustible, and the residue from the burning process reduced by grinding, to cement.

"Residues resulting from the processes above described can be added in the grinding operation to the mortar-forming agent obtained in either way and are of the Roman-cement nature.

"It is a particularly amazing feature of the whole procedure that the calorific energy, of the schistose coke is sufficient for the process, a fact which so far has never been anticipated nor recognized.

"The fuel content is so large that the new mortar-forming agents in their different forms can have added prior to burning them clay or marl, or mixtures of lime and silicates, according to the special conditions of the case.

"The process may be conducted in a shaft furnace or in a revolving tube-oven. In the upper cooler layers, oil, ammonia and the like are distilled while the residual fixed carbon is sufficient to convert the material in the combustion zone into a product of the nature of Roman cement."

Resent Selling Methods—Lumbermen Protest Practices They Consider Unfair

ENCOURAGING reforestation by advising the public to stop using forest products is the anomalous proposal now being advanced by sales representatives of a well established building material marketed in nation-wide competition with lumber, says a statement issued by the National Lumber Manufacturers Association. The lumber industry deplores this departure from frank and constructive merchandising practice so long observed in the construction materials field.

"Such solicitude for our forest resources lacks sincerity when it is manifestly a disguise for selling brick," says Wilson Compton, secretary and manager of the National Lumber Manufacturers Association. "No lumber famine is imminent. Nor may forests be wisely conserved by refraining from using them. Lumbermen may not be expected to view complacently such specious presentation of the forest problem. Our forest wealth must be kept useful if it is to be propagated profitably. In order to be useful it must be used. Curtailing lumber markets will not encourage reforestation. Under a system of scientific utilization and replacement, now well recognized among farseeing lumber manufacturers, there will continue to be abundant forest products for every reasonable need. Lumber is sold upon its merits and so continues to be the home builder's favorite material. Other building materials should be marketed the same way."

Constitution and Burning of Artificial Portland Cement*

Part IX. A Second Study of the Hydraulic Cementing Materials Other Than Artificial Cement—Causes of Defection of Mortars†

By J. E. Duchez, Engineer
(W'hur-Zurich, '06)
Authorized Translation from the French Revue des Materiaux de Construction
by C. S. Darling

[The previous number of this series was published April 18, 1925. It considered the causes of disintegration of cement, including incomplete hydration of some of the substances present and the formation of new compounds which would expand and break up the cement. The author refers to the equation for the set of cementing material:

$$Aq + Al_2O_3 3H_2O + 3(SO_3CaO) = Al_2O_3 3CaOaq + SO_3aq$$

and says

"With the object of verifying a similar equation, we have added to a fused cement of the formula 0.44 $(SiO_2 2CaO) + Al_2O_3CaO$ different quantities of plaster, and we have obtained the following results:

Mixture		Beginning of Set	End of Set
Fused Cement Alone		47 min.	3 hr. 40 min.
Fused Cement + 100	5% plaster	17 min.	55 min.
	15% plaster	12 min.	39 min.
	30% plaster	7 min.	28 min.

"These experiments prove that the hydrated alumina takes up the lime of the plaster to form $Al_2O_3 3CaOaq$ and that the addition of plaster to a cement does not necessarily lead to a retarding of the set. There may be an acceleration.

"However, in the fused cement considered, there is no free lime. This experiment, therefore, does not prove that the dissolving of the free lime prevents that of the sulphate of lime or the compounds of alumina with the sulphate of lime.

"We have, therefore, been led to make the following experiments:

1. To verify whether or not the set of the aluminate remains the same in the presence of $Ca(OH)_2$ or in the presence of SO_3CaO2H_2O."]

Case II

Continuation of Experiments With Additions of Plaster

II. If they remain similar by replacing by hydrate of lime one part of the lime in the plaster.

The additions of plaster of the preceding experiment would correspond to

5% plaster equals 2.05% CaO.
15% plaster equals 6.15% CaO.
30% plaster equals 12.3 % CaO.

The additions having been made with gypsum crystals—selected—corresponding practically to the theoretical gypsum and the water having been taken account of in the mixture.

The lime added is similarly a theoretical lime, 98.98% $CaCO_3$ in the limestone, and the addition made under the form of $Ca(OH)_2$ in order to take account of the water in this mixture.

Mixture		Beginning of Set	End of Set
Fused Cement Alone		47 min.	3 hr. 40 min.
Fused Cement + 100	2.05% $Ca(OH)_2$	16 min.	52 min.
	6.15%	12 min.	38 min.
	12.30%	7 min.	30 min.

Finally we made the experiment by replacing only half of the plaster by lime.

From this it results that the speed of solution remains the same whatever may be the addition of lime or plaster or mixture of lime and plaster, for the slight differences noted in the times of set are insignificant.

		Beginning of set	End of set
Fused cement alone		47 min.	3 hr. 36 min.
Fused Cement + 100	2.5 plaster + 1.03 $Ca(OH)_2$	17 min.	54 min.
	7.5 plaster + 3.07 $Ca(OH)_2$	11 min.	36 min.
	15.0 plaster + 6.15 $Ca(OH)_2$	7 min.	30 min.

The addition of plaster to a cement does not necessarily result in a slowing of the set, variable according to the quantity of sulphate of lime added. The retarding should occur only after saturation of the aluminate to three molecules of bases, and there will probably always be an acceleration and not a retarding if this condition is not fulfilled or if the quantity of plaster added corresponds exactly to this condition, taking into account the free lime existing in the cementing material.

These experiments have been conducted not only from the point of view of the set but equally from the point of view of strength and disintegration.

We were at first surprised to see that the fused cement with 30% plaster added gave high strength and remained stable in hot water.

Mixture		Disintegration in Tension at 48 hours	Hot water
Fused cement alone		16 kgr.	None
Fused Cement + 100	5% plaster	17.30 kgr.	None
	15% plaster	22.40 kgr.	None
	30% plaster	29 kgr.	None

We have therefore been led to seek what quantity of plaster was necessary to add to fused cement and to the other cements to result in decomposition after 48 hours in hot water.

b. Quantity of Plaster Added to Cement—The experiments are based on three cements of different chemical composition:

1. Artificial portland cement.
2. Quick setting natural cement.
3. Fused cement.

The additions of plaster were made by increasing the quantities by an amount of 0.5% of cement until briquettes were obtained which showed traces of disintegration after 48 hours in hot water.

1. Artificial Portland Cement

The chemical composition of the cement is as follows:

	%		%
SiO_2	22.69	MgO	2.64
CaO	63.68	Fe_2O_3	3.74
Al_2O_3	7.65	H_2SO_4	Trace

This cement was burned at a high temperature in the rotary kiln, so that the magnesia can be considered as combined with the acids.

The silica will require to

	Bases
form SiO_2 2CaO .... 22.69 × 1.866 =	42.34%

The alumina will require to

form Al_2O_3 3CaO ...... 7.65 × 1.647 =	12.60%
Total bases necessary	54.94%

If the silicate formed has for formula

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$SiO_2.3CaO$, the quantity of bases necessary will be:

For the formation of:
$SiO_2 3CaO$ ....22.69 × 2.8 = 63.65%
For the formation of:
$Al_2O_3 3CaO$ .... 7.65 × 1.647 = 12.60%

Total of bases necessary.......... 76.25%

Now the quantity of bases contained is only:

63.68% CaO + 2.64% MgO = 66.32% bases.

This proves once more that the compound $SiO_2 3CaO$ is scarcely probable in the cement, as we have not taken account of the Fe_2O_3 in this particular case, and which necessarily will absorb some lime (base).

Therefore, if we admit that the formation of $Al_2O_3 3CaO$ is easier than that of $SiO_2 3CaO$ the aluminate may be found in this cement in the form $Al_2O_3 3CaO$, and the quantity of tricalcic aluminate formed is:

	%
Total alumina	7.65
Lime combined with alumina	12.60
Quantity of tricalcic aluminate formed	20.25

According to Candlot, Michaelis and Deval, the formula of sulfo-aluminate of lime is $Al_2O_3 3CaO 3(SO_3CaO)$.

The transformation of $20.25 Al_2O_3 3CaO$ into sulfo-aluminate of lime will require

$$20.25 \times 1.51 = 30.58 \ So_3CaO$$

since the relation of sulphate to aluminate is:

$$\underset{270}{Al_2O_3 3CaO} + \underset{408}{3(SO_3CaO)}$$

$$\frac{408}{270} = 1.51$$

in the sulfo-aluminate

$$Al_2O_3 3CaO 3(SO_3CaO).$$

Now, in the experiments which we have carried on, the quantity of plaster for which the cement does not disintegrate is only 3% and it disintegrates in hot water for an addition of 3.5%.

We can, therefore, say that in relation to the quantity of sulfo-aluminate of Candlot capable of being formed this cement will permit only

$$\frac{3}{30.58} = \frac{1}{10} \text{ of the total.}$$

2. *Quick Setting Natural Cement*

The chemical composition of the cement is as follows:

	%		%
SiO_2	22.40	MgO	6.44
CaO	52.20	Fe_2O_3	4.76
Al_2O_3	9.60	H_2SO_4	4.30

Since this cement has not been strongly burned, we can assume that the magnesia is not combined with the acid.

This opinion may be questioned, but for us there is no doubt of it; it follows absolutely from what we said on the subject of aluminates of lime and the manner in which these act on hydration at the moment of set.

In fact, if the lime alone is combined with the acids, the cement obtained will correspond to the following conditions:

	%
Lime needed for combining with the silica..22.40 × 1,866 =	41.80
Lime needed for combining with the alumina .... 9.60 × 1.647 =	15.81
Total lime needed for combining with the acids	57.61

Now the cement contains only 52.20% CaO and we have not taken account of the Fe_2O_3 and the H_2SO_4. The quantity of lime lacking for the formation of $Al_2O_3 3CaO$ is therefore:

$$57.61 - 52.20 = 5.41\%$$

The aluminate of lime therefore can absorb only:

$$15.81 - 5.41 = 10.40\% \text{ CaO.}$$

That is to say that from the molecular point of view, the aluminate formed will have an elementary composition of $0.94 Al_2O_3 + 1.85$ CaO maximum, corresponding approximately to:

$$Al_2O_3 2CaO.$$

The aluminate formed is a bicalcic aluminate or nearly so, the hydration of which in the presence of a solution of a base causes the rapid setting of the cement.

If, on the contrary, the magnesia was combined under the influence of the burning, the cement would correspond to the following conditions:

Base necessary for combining with the silica ....22.40 × 1.866 =	41.80
Base necessary for combining with the alumina .... 9.60 × 1.647 =	15.81
Total of bases combining with the acids	57.61

As in this case the magnesia is taken account of, this total of bases would be 52.20 + 6.44 = 58.64%.

There would be an excess of bases and the aluminate formed would be tri-basic and could not cause a rapid set since it already contains three basic elements.

This fact is verified in practice since the limestines of quick setting cement when overburned give slow or moderately slow setting cements (Domme cement, Isere cement).

Therefore, since the cement which was used in the experiment was rapid setting, we must admit that the bases were not all combined, and that consequently the aluminate formed was less basic than $Al_2O_3 3CaO$. The lime combined with the alumina was therefore 10.40, and consequently the quantity of aluminate formed:

$$10.40 + 9.60 = 20\%.$$

Now, on setting, this alumina will seek to absorb 15.81% of base to be transformed to:

$$15.81 + 9.60 = 25.41\%$$

of tribasic aluminate, and this result can occur only with magnesia which this cement contains, since we have assumed that all the lime was combined with the acid.

But if we add plaster to this cement, the alumina, as we have shown, will be capable of absorbing the lime of the plaster to complete the three molecules and it will absorb the lime more easily from the sulphate than the magnesia of the cement, the solution of which is slower.

The quantity of base lacking being 5.41%, the quantity of plaster necessary for the transformation of the aluminate into tribasic aluminate will be:

$$5.41 + (5.41 \times 1.428) = 13.13\%$$

and as the quantity of tribasic aluminate then formed will be 25.41%, this aluminate in order to be transformed into Candlot's sulpho-aluminate can therefore absorb:

$$25.41 \times 1.51 = 38.36\% \text{ plaster}$$

From this it results that the quick setting cement considered would be able to absorb:

$$38.36 + 13.13 = 51.49\% \text{ plaster.}$$

Now, in the experiments this cement remained stable with 6% plaster added and disintegrated after 48 hours in hot water with an addition of 6.5%.

We can say, therefore, that with relation to the quantity of sulpho-aluminate capable of being formed this cement permits only:

$$\frac{6}{51.49} = \frac{1}{8} \text{ of the total.}$$

(To be continued.)

New Topographic Map in New York

THE Interior Department's topographic map of the Belmont quadrangle, in Allegany county, New York, recently published by the Geological Survey as a unit in its series of "mile to the inch" maps, is a very good example of standard modern map making, both in production and in reproduction.

The Belmont quadrangle is immediately north of the Pennsylvania line, about 60 miles west of Elmira, and includes the towns of Belmont, Friendship and Bolivar. All these towns are in the flat valleys, which appear conspicuously on the map in contrast with the rougher country and which on the ground serve admirably as routes for highways and railroads. Copies are sold for 10 cents each.

Alpha Cement Adds Storage

THE Alpha Portland Cement Co. is erecting new warehouses and packing plants at Martins Creek, Penn., and at Manheim, W. Va.

The Martins Creek plant will have a stock house consisting of 12 bins, each 33x80 ft. with an aggregate capacity of 275,000 bbl. The packing plant will be equipped with 8 Bates valve-bag packers.

At Manheim, W. Va., the stock house will consist of 8 bins, 30x80 ft. with an average capacity of 150,000 bbl. The stock house will have four Bates valve-bag packers.

The general contract for the design and construction of both plants has been let to the MacDonald Engineering Co., Chicago, Ill.

Blue Diamond's New Gypsum Quarry

Deposit Which Is 30 Miles Out in the Desert from Las Vegas, Nevada, and High in the Mountains, Is Chosen Because of Its Purity

By Kay M. Grier
Executive Representative, Blue Diamond Company, Los Angeles, California

THE "End of the Trail" has been reached after a three year search by the Blue Diamond Company of Los Angeles for an "ultimate" desposit of gypsum.

Looking toward the quarry from a point along the tramway

On the highest peak of a mountain range about 30 miles southwest of Las Vegas Nevada, Blue Diamond engineers located what we believe is the richest deposit of pure gypsum in western America. It shows a volume of more than 10,000,000 tons of rock in place and presents the opportunity for an unusually economical operation.

It is not uncommon for Blue Diamond to build new units of production or extend its operations to new fields. But there seemed to be more romance—even a touch of adventure and daring—in developing this new deposit than in any other previous exploit. It meant the absolute abandonment of all other gypsum properties owned or leased by the company in California, Nevada and Utah, in addition to a cash outlay of more than a million dollars.

It so happened that we found the purest and whitest gypsum capping the highest peak in the desert, so we got little assistance from nature. It required the building of 11 miles of private standard gage railroad to connect with the main line of the Union Pacific. But even this project did not settle the matter of transportation. The rock we wanted was still 100 ft. higher than where the railroad had to stop climbing. No engine could ever hope to get a string of cars to the peak. So that meant an aerial tramway.

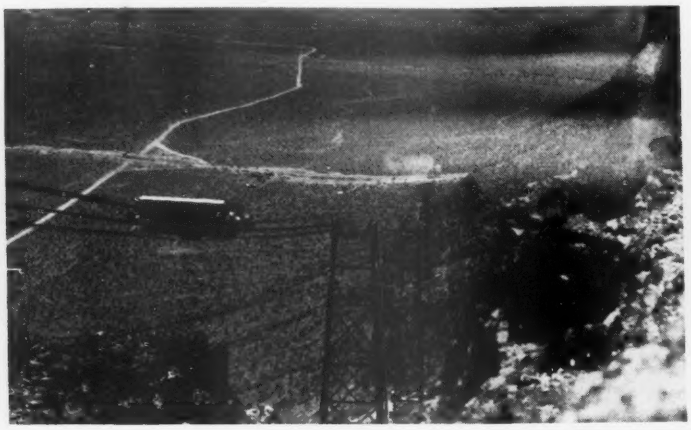
The next problem was to provide a means of transportation from the end of the railroad to the quarry, a distance no further than the range of the human voice. But this shortest way was through a rocky, precipitous chasm. And that meant the building of a truck road eight miles long to come into the quarry by the "back door" with provisions and equipment.

Oh, what a road that turned out to be! Just round and round, up and up, blasting, cutting, filling to make a trail to the peak. Under the scorching glare of the summer sun and through snow, ice and wind of winter the road went on and up and around. Is it any wonder that the first crew of workmen sent into the desert reflected many times, "What a God-forsaken country—what a helluva job to do."

But today the job is finished and is a splendid example of enterprise and development. The railroad, tramway and truck road are complete. A camp has been established, machinery installed, a quarry opened and several thousand tons of material shipped to Los Angeles, manufactured into plaster and sold.

Crushing and conveying units, located at the edge of the quarry floor

Hundreds of tests of gypsum from all parts of the west were made in the Blue Diamond testing laboratories before a final decision was reached to acquire the Nevada property. Even an airplane was obtained by the company and placed at the disposal of Glen R. Bradley, superintendent of the gypsum department, and C. H. Coll, civil engineer, for inspection of various properties.



Left—Looking down the tramway toward loading bunker. Right—View of quarry, lower bunker and tramway from a distance

Left—Showing result of a shot. Right—Loading gypsum after the first shot

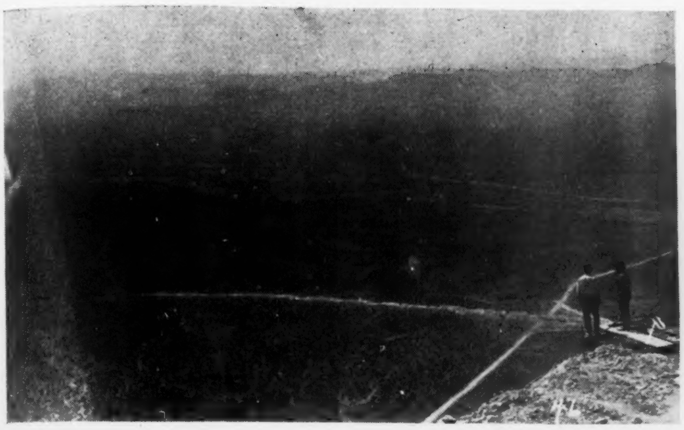
Left—View of the 18-ft. quarry face. Right—Train of automatic bottom-dump quarry cars to be put in service when quarry floor is extended

The fact that so many obstacles stood between the plaster consuming market and that mile high peak in the desert, development of the project in many ways challenged the courage and enterprise of the Blue Diamond organization. There was no secret about the extent and quality of gypsum that lay at the top of the desert mountain. Others had known it to be there for many years but all had shunned the difficulty that stood in the way and the tremendous expense involved.

Until the quarry floor is opened sufficiently to permit heavy blasting the rock is being loaded by hand. As the quarry floor is extended a steamshovel will be put in operation to dig and load the rock into 2-ton automatic dump bottom steel cars manufactured by the Sanford-Day Iron Works of Knoxville, Tenn.

From the quarry cars the rock is dumped into a primary 30x44-in. Ehrsam Enterprise jaw crusher. Below this unit is a secondary Ehrsam Enterprise rotary, which reduces the gypsum to ½-in. size.

The crushed rock is then carried by a



Left—View from edge of quarry floor of desert 1000 ft. below. Right—First group of workmen's houses built at Blue Diamond, Nev.

belt conveyor from the secondary crusher to a tramway loading hopper of 120 tons storage capacity.

The aerial tramway is of the loop line type and was manufactured and installed by the Interstate Equipment Corporation of New York. It is supported by 11 steel towers ranging in height from 30 to 83 ft. It is 3460 ft. from terminal to terminal with a fall of 1000 ft. in that distance. The track cables are strung in three sections and counter-balanced with heavy weights to provide the proper tension.

Steel buckets, each holding 18 cu. ft., are at present spaced 407 ft. apart. They travel 360 ft. per minute, making a capacity of 40 tons per hour production, without adding more buckets to the line. The tramway operates by gravity and generates considerable additional power to assist in the operation of the plant.

Crushers, compressors, generators and other machinery are supplied with power by a Fairbanks-Morse 150 h.p. Diesel engine.

Gypsum produced at the new deposit is shipped over the Union Pacific Railroad to Los Angeles where the company has a modern plaster mill on its thirty-acre tract in the heart of the city's industrial district.

In addition to manufacturing a large quantity of hardwall and finishing plaster for the building trade of California, which is distributed by Blue Diamond and 300 wholesale dealers, the company also furnishes a vast quantity of casting plaster to the moving picture studios of the Southland.

[In the letter which accompanies the above story Mr. Grier writes: "In addition to the photographs, I am sending you a broadside for announcing the new department to our trade. It is the first piece of production in a $25,000,000 advertising campaign which we are running in connection with plaster. The broadside is a handsome piece of printing containing the facts given in this story in condensed form.

There is, as Mr. Grier writes, more than a touch of romance and adventure in opening up a desert deposit, and those whose only experience has been in parts which lie near cities and towns where supplies and

The railroad-loading bunker at bottom of tramway—capacity 450 tons

repair parts can be had an hour or so after telephoning in the order might well wonder that so difficult a situation should be chosen. —The Editors.]

Scheme for Producing Oil from Shale as By-Product at Tasmania Cement Plant

A SCHEME, covered by patents, has been devised at the Railton Cement Works, Tasmania, by E. G. Stone, whereby the waste heat from the rotary kiln is used for "destructive distillation" of oil shale, large deposits of which are available in the vicinity. According to an account in the *Journal of Industry and Mining Standard*, **72**, 639 (1924), the oil vapors issuing from the shale are drawn from the retorts by means of exhausters through condensers. After all the oil has been so extracted the gas still contains a certain amount of light spirit, which will again be extracted in scrubbing towers. One of these scrubbing towers will work under vacuum and the other under press. When the light spirit is extracted there still remains a large proportion of what is termed "fixed gas." The patents cover the use of this gas for assisting to calcine the cement mixture into clinker. As there is not sufficient gas in the amount of shale to be treated to calcine such cement mixture the necessary amount of heat will therefore be built up by using the poorer qualities of oil collected during the special process.

British Concrete Road Will Be Colored Green

AN attempt to solve the special traffic problems of a fishing port has been made by the Corporation of Great Yarmouth, which has embarked on an extensive program of all-concrete road construction. To give a more restful appearance to the promenades the concrete pavements will be tinted green, a procedure recently recommended by a prominent optician as a specific against eyestrain.—*(British) Contractors Journal.*

One of the towers of the Blue Diamond aerial tramway

Utah Copper Blasting Methods

The System Developed by the Company Which Is Said to Hold the World's Record for Tonnage

THE Utah Copper Co. is said to have quarried and removed more rock than any other company in the same length of time, so its methods should be interesting to those who are engaged in nonmetallic mineral industries. The following account of its drilling and blasting practice is abstracted from the *Engineering and Mining Journal.*

Blasting practice has been reduced to the most direct procedure. Ingersoll-Rand drills with 3½-in. pistons, mounted on tripods without leg weights are used. The starting bit is 3-in. in diameter and the bits in a set of 11 vary by ⅛-in., the finishing bit being 1½-in.

Three kinds of holes are used—toe holes, bank holes and vertical holes on the berm near the edge. The first two point down at a low angle. Toe holes are drilled from a position slightly above the bench level and are bottomed at about grade. They are spaced 10 to 15 ft. apart. Two drills are operated for each steam shovel, one crew ahead of the shovel putting in bank holes and the other behind the shovel putting in the holes.

A drill averages 30 ft. per shift. The sequence of holes is shown in Fig. 1. The toe hole is first blasted, which gives a position for drilling, the next hole above is blasted which gives a position for the third hole. Two holes between the top and toe holes are generally required for breaking a bench from 75 to 90 ft. in vertical height.

All drill holes are sprung, the toe holes in sequence in groups of fifteen. The first springing charge is five sticks (1¼x8 in.) of powder, followed by one bucket of water. A primer with a short fuse is ignited and sent to the bottom with a tamping stick and the charging pipe withdrawn. All powder is charged through a 1¼-in. pipe, 20 ft. long. A wooden tamping stick is used to slide the powder down to the bottom, a number of sticks being placed in the pipe and then sent to the bottom. After the first chambering shot the tamping stick is run in and withdrawn and tested for temperature. The charging pipe is placed in position and 15 to 20 sticks are run in. Two buckets of water are then poured in through a funnel which is made from the packing paper of the explosive. A primer is inserted and the pipe is withdrawn. A third priming charge, 35 to 40 sticks, follows the same procedure, with the exception that four buckets of water are used. The fourth or last priming charge consists of 75 sticks, or more, of powder followed by six buckets of water. This completes chambering and the hole is ready for the final charge, which consists of five or six boxes of powder. The water serves the purpose of stemming.

A single primer is used for springing shots. The cap is placed in the side and the short fuse length laced through the cartridge and sometimes looped around the top and held with tape. For final or main blasts two primers are used. These are placed in the cartridge and laced through and taped. Springing holes is done systematically, the blasting team of two men working on a hole and when finished going to the next hole. From three to five men to a shovel attend to blasting operations. Main blasts are exploded in groups of six to ten holes and sometimes 12 to 16. The procedure with 12 holes is as follows: the holes are grouped in threes and three teams of two men each handle the primers. The three teams take the three holes in a group.

The 12 holes are blasted in sequence in groups of three. The time interval between each blast is short. No. 1 hole cushions No. 2 blast, and so on down the line. Long experience has resulted in the work being done rapidly in the necessarily short time.

The explosives ratio is one pound to six tons of ore. In April, 1924, the average on ore and overburden was 226 lb. per 1,000 cu. ft., or approximately 0.15 lb. per ton. Caps and fuse cost $0.0007 per cu. yd. Including fixed general and maintenance charges, the mining costs in 1923 were approximately $0.35. This includes loading and transfer to train yards and 12.5c for stripping. The actual direct cost of mining was 22.38c per ton, which includes 3.2c for fixed and general charges.

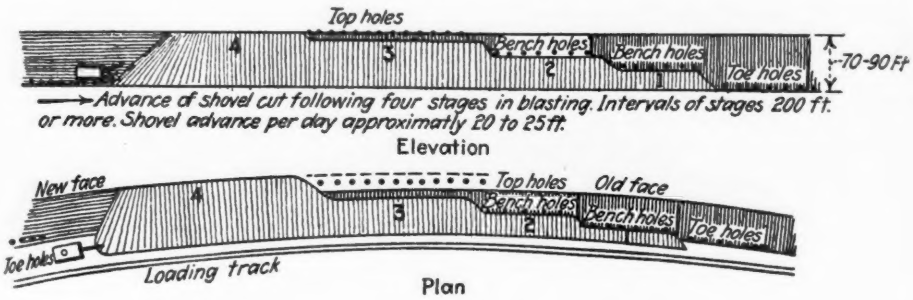
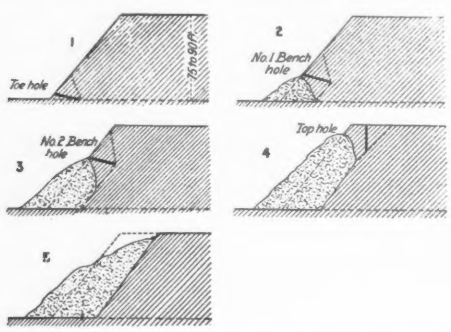


Fig. 4—Progress of the work along the face

The height of benches varies from 65 ft. to a maximum of 222 ft., and averages 70 ft. Each joins with the switchback system, which is on a maximum 4 per cent grade and connects with the train yards. There are seventeen benches, and one shovel is operated upon a bench. Only one shovel cut is required on the low benches, but on the high bench three cuts are necessary. In Fig. 4, the limiting angles of the faces of the bench and repose angle of the broken rock are shown in approximate relationship for an average as well as for the highest bench.

Shovels are advanced from the south to the north following the completion of blasting operations. Drilling of toe holes is done in the wake of the shovel. These are chambered and blasted in groups. The drilling of the bench holes and completion of the blasting is in advance of the shovel a sufficient distance to avoid interference. A new cut is ready for the shovel to begin upon as soon as it has finished. The sequence of operations, which are the same in overburden and ore, is shown in Fig. 4.



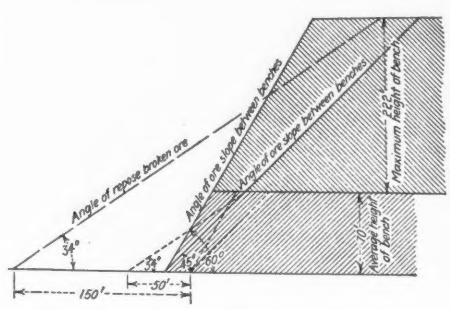


Fig. 1, sections through the face, and Fig. 3, enlarged section

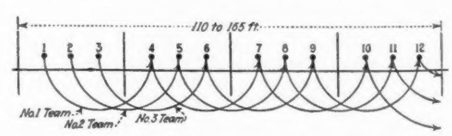


Fig. 2—How the blasting teams work

Double Quarry Produces Coarse and Fine Concrete Aggregate

A. B. Cooper, Inc. Crushes Trap Rock and Sandstone in Two Plants Near Johnstown, Penn.

THE country around Johnstown, Penn., does not contain much material for making concrete aggregate. The rocks, as shown by exposures in the railway cuts, are mostly slate and shale. The bed of the Conemaugh river, which flows through the town, contains neither gravel nor sand in commercial quantities. So aggregate materials are mainly imported; river sand and gravel from Pittsburgh and crushed stone from the limestone deposits near Altoona.

Home production is confined to the plants of A. B. Cooper, Inc., on a ledge that outcrops a mile beyond Coopersville, which is a suburb of Johnstown. This outcrop lies along the highway and the railroad track, so that it is easy to ship both by truck and rail. And nature has obligingly laid down trap rock for coarse aggregate at one part of the deposit and sand rock for fine aggregate at the other. Rock from these ledges is crushed and sized by two small plants about 200 yd. apart on the highway, and while these plants do not produce large tonnages, they are well managed and efficient, and contain many novel and interesting features.

The trap rock plant was rebuilt from a plant which was erected many years ago by a company that did not understand the quarry business. They opened the ground in a haphazard kind of way and proceeded to get out the rock that was easiest to quarry without regard for future operations. "Hogging the rock," is what some quarrymen call this.

To keep up production, rock, in the present operation, has had to be taken from the old workings, but Mr. Cooper and his sons (organized as A. B. Cooper, Incorporated) are opening the ground properly, intending to take everything above a floor that underlies the ledge.

Jackhammers are used for drilling, air being obtained from an Ingersoll-Rand compressor. Holes are put down 15 ft., which is about as far as it has been found practical to carry a hole with 1-in. steel. The holes are then sprung with a few sticks of dynamite and afterwards loaded with both 40 and 60% Dupont straight dynamite, the heavier charge being placed at the bottom of the hole. The rock is extremely hard but breaks well. Some block holing is needed to reduce it to a size the crusher will take.

The broken rock is hand loaded into a side dump car that is let down an incline by a home-made electric hoist. This is just an ordinary "crab" of the type so much used around coal mines, and it was in their own coal mine, not far from Johnstown, that the Coopers developed this machine. They expect to discontinue its use when the quarry is opened properly as the quarry floor will then be on the crusher level.

The car is dumped into a small bin which feeds a No. 5 Gates crusher, an "old-timer" which has seen perhaps 20 years of service. The discharge of the crusher falls into a chute which feeds it to an 18-in. belt conveyor.

This conveyor is one of the many "home-made" devices around the plant. The frame is of 2x8-in. timbers on top of which are the troughing rolls which are plain wooden spools turned out at a local woodworking plant. The return idlers are wooden cylinders covered with 3-in. pipe. Both sets of rolls are run with plain bearings lubricated from grease cups. Crude as this conveyor appears (it is, in fact, about like the origi

Left—The trap rock plant is connected with the bins at the roadside by a long inclined chute. Right—Working at the old face in the trap rock ledge

nal of all American belt conveyors) it does its work and does not seem to be hard on the belt.

From this conveyor the rock goes to a 14 ft. (Good Roads Machinery Co.) screen with 2½-in., 1¼-in., ¾-in. and ½-in. openings. Each size falls to its own bin through a long inclined chute.

There is a strong demand for ¾-in. stone in this market, and not much for 2½-in. stone. So a small belt takes the 2½-in stone along with the oversize of the screen to a Climax (Good Roads) 6x8-in. jaw crusher.

This belt is 14-in. wide. The pulley at one end is on the shaft from which the jaw crusher is driven. The other pulley is on a jack shaft. The belt runs faster than is usual with conveyor belts but a trough of boards keeps the stones from jumping off and the arrangements works very well. It was a considerably simpler construction than putting in gears for reducing the speed.

The undersize of the ½-in. screen, with the dust, is sold for road dressing, and it finds a ready market in this locality.

At the sandstone quarry the practice of drilling and blasting is the same as at the trap rock quarry but the broken rock is lowered to the plant by a gravity hoist, the loaded car going down pulling the empty car back. The rock (one-man stone size) is dumped to a No. 3 Gates, which is another veteran with some twenty years of service to its credit. From this crusher the rock falls to a "dry pan" made by the American Clay Products Machinery Co. The

Left—Crusher in the trap rock plant. Right—Screen and return elevator in trap rock plant

Left—Old face showing trap rock and sandstone ledges. The division is marked by the line of vegetation in the upper part of the picture. Right—Face being opened on a new quarry floor. The floor shows behind the stake

pan itself is 9 ft. in diameter and two rollers of the edge-runner type, each about 5 ft. in diameter turn in it. The pan is floored with perforated plates of hard cast iron and the rollers have hard cast iron tires about 8 in. thick when they are new. Tires and bed plates last a year. By the end of that time the tires are about 1½-in. thick and this is about as thin as it is safe to run them. Both tires and bed plates are cast at a local foundry which buys back the scrap at a good price. The "dry pan" and "wet pan" are much used in preparing ganister and silica sand in Pennsylvania, so its use in this plant is natural. The discharge of the pan is through the holes in the bed plates.

This machine can crush 75 to 100 tons in 10 hr., breaking the rock from 3-in. so that all passes a ¼-in. square mesh screen. This does not seem a large capacity but the machine has the decided advantage of requiring very little attention or repairs. The proprietors of the plant like it so well that when they build the new plant they are designing they intend to use another "dry pan" of the same make but will buy one which has five times the capacity of the one now in use.

From the "dry pan" the rock goes to a bucket and belt elevator to the plant screen. This is a shaker of very simple construction which was developed from a Rock Products article published in 1921. The main frame is of 2x8-in. pieces, 16 ft. long set 2 ft. apart. The frame hangs about 15 deg. from the horizontal and is suspended by four strips of hickory 4-in. wide and ½-in. thick and about 5 ft. long. These bend back and forth at each stroke.

At the center of the screen is a block to which is fastened a spring-pole pitman, made from a locust sapling. The other end is bolted to a 4-in. crank on the drive shaft. This shaft also carries a fly wheel about 12-in. in diameter and 6-in. thick at the face. The screen will not work well without a fly wheel, and A. B. Cooper, Jr., who designed it, says that the fly wheel could be heavier to some advantage.

The frame makes 138 8-in. strokes per minute which carries the material forward at a lively gait. The actual screening surface is only 4 ft. long by 2 ft. wide, the rest of the frame acting as a conveyor. There is a steel plate at the upper end on which the discharge from the elevator strikes.

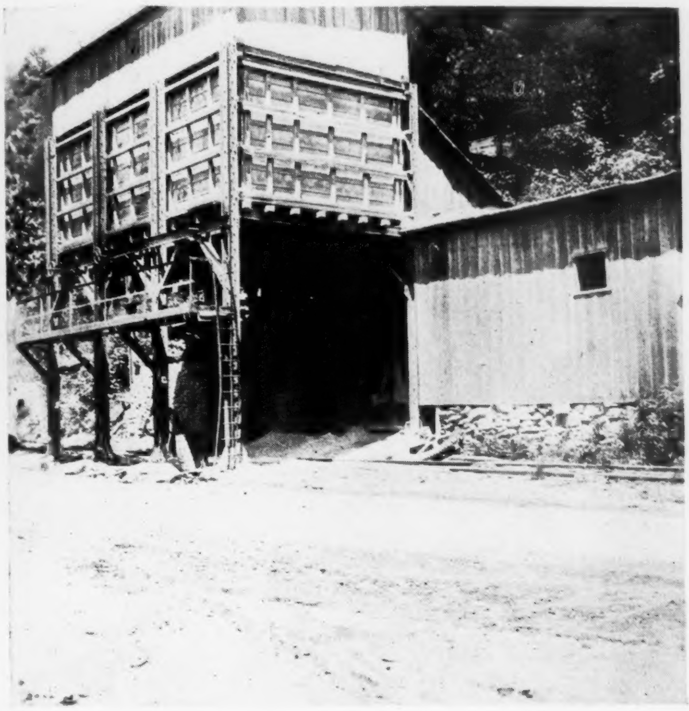
This screen has superceded an ordinary revolving screen, which took the place of a shaking screen which was installed when the plant was built. Neither of these screens could be kept from blinding in wet weather. The plant had to be shut down and the men sent home after a heavy rain had fallen. But the present screen gives no trouble in any weather.

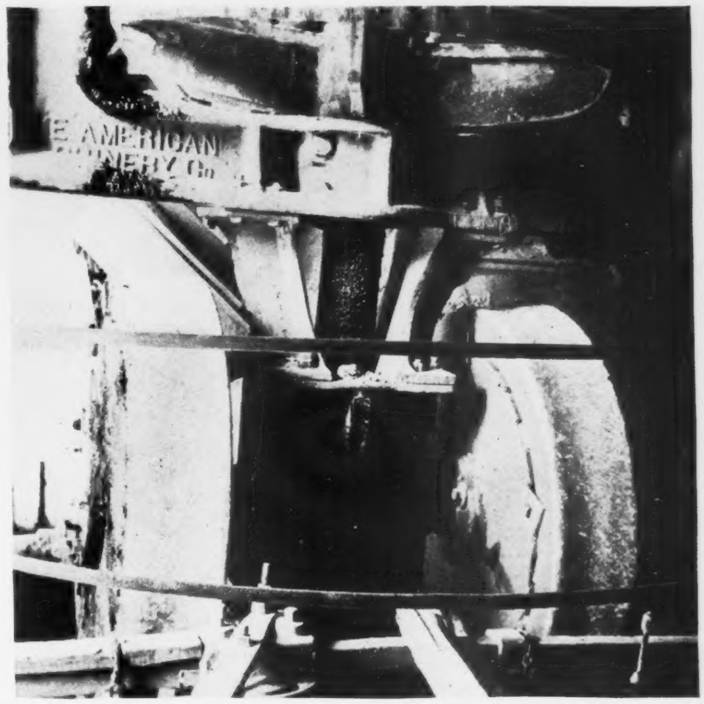
Both Concrete and Furnace Sand

The product of this plant is sold almost wholely as concrete sand, although some of it is disposed of at the steel works as furnace sand. The market for both purposes is very good and an increased capacity plant is assured of all it can produce.

A. B. Cooper, the head of the company, has been a resident of Cooperdale all his life, the town being named for his father. Of the sons who are interested with him only one, A. B. Cooper, Jr., is active in the management of the plant. It is his ingenuity that is responsible not only for the design of the plant but for the many clever "home-made" devices it contains.

Aside from these, the plant is exceptionally well built. The crushers are on very heavy concrete foundations and the frames of the bins are of structural steel. Then there is that sure mark of an efficiently working plant, a decent sense of order in the way the plant is kept up. It will be interesting to see what sort of a plant will be evolved from such an ingenious mind when the new plant is built.





Left—The sandstone crushing plant. The machinery is below the bins at the back. Right—The dry pan used for crushing sandstone to concrete sand

Cooperative Insurance at Lithonia, Georgia, Quarry Plants

J. K. DAVIDSON, president of the Davidson Granite Co., which, as noted in the June 27 issue of Rock Products, produces crushed granite as a by-product at its quarry plant at Lithonia, Ga., has signed contracts with the Metropolitan Life Insurance Co., which provides 115 workers with group life insurance protection totaling approximately $100,000.

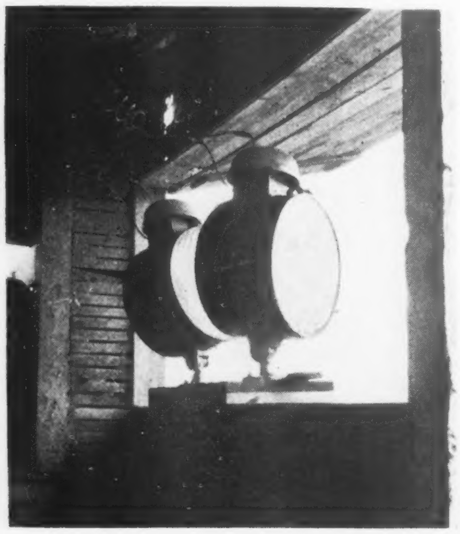
The policies were written on co-operative bases, the company and the employes sharing the cost of the insurance. Each unskilled worker who contributes to the plan is insured for $500 and in event of illness or non-occupational accident will be paid $5 a week for a maximum of 13 consecutive weeks. Contributing skilled employes receive $1,000 insurance and $15 weekly sick benefits.

Fred C. Mason, secretary and treasurer of the Arabian Granite Co., Lithonia, Ga., has signed similar contracts with the Metropolitan company for its 100 employes, totaling about $100,000 insurance.

Hints and Helps for Superintendents

Flood Lights for Working Quarry at Night

OPERATIONS at the plant and quarry of the Dolomite Products Co. go on in the night the same as in the daylight. This is made possible by the use of the two flood lights shown in the illustration. They are mounted in a window of a small building used as a storehouse on the edge of the quarry excavation so that the light can be thrown down upon the work.



These lights are mounted in a building on the edge of the quarry and give plenty of light for loading trucks with an electric shovel

The lights are perhaps 150 ft. away from the electric shovel (which at this quarry loads into trucks) and 60 to 70 ft. above it. The men say that the light is abundant, in fact a newspaper can be read at the shovel quite easily.

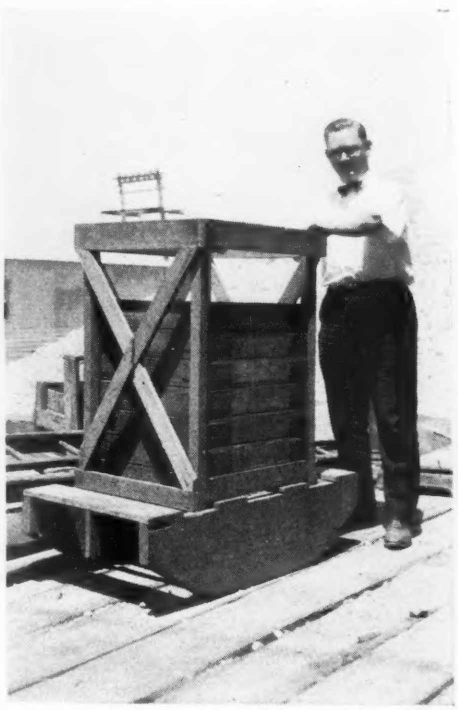
The flood lights are of a type much used for illuminating buildings and like work and are not specially made for the purpose. The cost of operating is very little when the advantage of carrying on the work at night is considered. The idea of using flood light in this way came from John Odenbach, one of the owners of the Dolomite Products Co. Rochester, N. Y.

Shaking Sieves for Gravel Testing

MANY gravel plants today are compelled to have a set of testing sieves for the product as highway material specifications are fairly rigid as to the percentage that can remain between two screen sizes in the finished product. The small sieves furnished field inspectors of highway departments are often used at the plant but they are so small that screening a large sized sample with them is a tedious process.

Many plants make their own testing sieves, buying either wire mesh cloth or perforated metal for the screening medium. If these are of moderate size, 18 in. or 2 ft. square, screening with them is not so long or laborious a task as screening with the smaller sizes.

The picture shows a method of shaking all the sieves together so that considerable time and labor is saved. The sieves are placed one above the other in an upright frame which is mounted on a pair of rockers. The sample, which may be 50 lb. or even more, is poured into the top sieve and the whole is rocked back and forth by the framework at the top. In a very short time the gravel is separated into its mesh sizes and is ready to be weighed.



Nested sieves mounted on rockers for gravel testing

The rockers are not rounded, but are angular. This gives a decided jolt to the sieves as the rocker goes over and helps the screening.

This device is furnished to inspectors of material of the New York Transportation board which buys a great deal of concrete material to be used in city work. The picture was taken at the plant of the Seaboard Sand and Gravel Corp., Port Jefferson, Long Island, N. Y.

Separating Sand from Pump Discharge

AT the plant of the Seaboard Sand and Gravel Corp., Port Jefferson, L. I., water under heavy pressure is used in sprays on the screens to keep them clean. The sprays are on the outside of the screen and the force of the water drives back any pieces that are stuck in the meshes of the jacket.

Water for these sprays is furnished by a pump which has its suction in the bay a short distance from the shore. There is always a little sand in the water, owing to the dredging operations going on nearby and the filling of sand barges, and it was found that this sand cuts the wires of the screen jacket.

This damage to the screens was prevented by the simple contrivance shown in the cut which may be termed a sand trap. It consists of a cylinder 20 in. in diameter and 8 ft. high with the pipe connections shown. The suction goes in at the bottom and comes out at the top. The velocity of this rising current is so reduced that all but the finest grains of sand fall to the bottom of the cylinder.

The pump discharge enters at the bottom and goes out at the top

Two or three times a day the drain valve at the bottom is opened and the pressure on the line forces out the sand and some water. Since this device has been installed there has been no more trouble from sand cutting the screens.

Switch That May Be Thrown from the Locomotive

AT many plants where a single track incline is used for hauling loaded cars of stone up to crushers, empties are returned on a side track, and in order for locomotives to get these and haul them back to the shovel at the quarry it is necessary for the locomotive operator to get out and throw the track switch over to the proper position.

This means that the operator must get out of the locomotive twice; once to adjust the switch, so that he can get to the empty cars, and again when he has passed the switch, so that the returning locomotive with the loaded cars will get on the right track. If the operator of the locomotive himself does not get out, it is necessary to have an attendant at this switch, and this involves labor and expense.

The Iowa Limestone Co. of Alden, Iowa, solved this difficulty by devising a very ingenuous switching method, the details of which are shown in some of the accompanying photographs. Four posts were placed between the track at the switch point and a rope extended between them, each terminal forming a "Y," and at the terminal nearest to the switch having one end running over a pulley and attached to the handle of the switch throw. Thus, as the operator goes by, it is only necessary for him to pull on the rope, and the switch is adjusted in any position that he wants it. He does not have to decrease the speed of the locomotive at all in order to make this switch function properly. The action is much the same as that of the conductor giving the motorman of a street car a signal to go ahead. One pull of the rope and the track is turned.

The rope and its attachment to the switch and the block through which it passes are quite clearly shown in the center picture on this page.

Quarry trains which have passed the switches

Showing the rope and block by which the switch is thrown

Showing the two switches, each of which is provided with the arrangement described

New Use for Old Wire Rope

AT many plants where wire rope is used in connection with shovels and cranes, the rope is of no use after it has served its purpose on the shovel. At the plant of the Iowa Limestone Co., Alden, Iowa, this rope has been put to a good use. It is put on a well drill instead of the ordinary manila rope, and the company has found that, whereas a manila rope only lasts two months or so, that wire cable will last almost half a season on one drill. Of course, the cable is harder on the machinery, but the company has found that it is more economical to repair the machinery than to replace the manila rope.

A Modern Lime Plant from Above, Showing Quarry

Airplane view of the quarry and plant of the Dittlinger Lime Co. at Dittlinger, Texas. This is one of the largest and best known lime pl
produces high calcium limestone which is burned to chemical agricult

ing Quarry, Crushing Plant, Kilns and Hydrate Mill

nown lime plants in the southwestern part of the United States. Offices are maintained at New Braunsfels and Houston, Texas. The quarry
ical agricultural and construction lime. Texas lignite is used for fuel

Financial News and Comment

New England Lime Company Bond Offering

SECOND WARD SECURITIES CO., Milwaukee, Wis., are offering at 99½ and interest, $1,350,000 first mortgage 6% sinking fund gold bonds, Series "A" of the New England Lime Co. (Del.).

Dated July 1, 1925; due July 1, 1935. Principal and interest (January and July) payable at Bankers Trust Co., New York, trustee, without deduction for 2% normal Federal income tax. Denominations $1000, $500 and $100. Callable all or part on any interest date on 30 days' notice at par plus a premium of ½ of 1% for each year or fraction thereof between date of redemption and date of maturity. Pennsylvania and Connecticut 4-mills taxes and 6% Massachusetts income tax refundable. Authorized $2,000,000.

SINKING FUND—Beginning July 1, 1927, 25% of net earnings for each year will be devoted to the sinking fund for the retirement of bonds, with the further provision that the minimum to be paid in any year shall be $50,000.

Data from letter of President J. King McLanahan, Jr.:

COMPANY—Incorporated June 22, 1925, in Delaware. Successor to the New England Lime Co. (of New York), which was incorporated in 1902 as a merger of seven of the largest companies in western Massachusetts and Connecticut. Company produces both high calcium (chemical) and magnesium (building) lime from seven modern plants serving one of the best industrial territories in the United States.

Company's high calcium quarries and deposits at Adams, Rockdale and New Lenox, Mass., and North Pownal, Vt., are among the most accessible and valuable deposits in the district. Its magnesium deposits at Canaan, East Canaan, New Milford and Redding, Conn., comprises large quantities of high-grade stone. Capacity of plants is about 3500 bbl. of lime of 280 lb. each daily.

Company produces high calcium granular lime, high calcium lime, magnesium lime, whiting, asphalt filler and hydrated lime. Its trade brands are thoroughly established as products known for their very high quality throughout its territory. It is the only large producer of the famous New England granular lime.

EARNINGS AVAILABLE FOR INTEREST, DEPRECIATION, DEPLETION AND TAXES, YEARS ENDED JUNE 30

1920	$294,790
1921	240,999
1922	422,329
1923	435,098
1924	565,713
1925 (10 mos.)	406,181

PURPOSE—Proceeds are to be applied on the purchase price of the assets of the New England Lime Co. (of New York).

BALANCE SHEET APRIL 30, 1925
(After Financing)

Assets—	
Cash	$187,951
Receivables	127,027
Inventories	190,211
Fixed assets	3,692,390
Deferred charges	137,623
Total	$4,335,201
Liabilities—	
Accounts payable	$42,695
Accruals	22,524
Reserve for Federal taxes	57,150
1st Mtge. 6s	1,350,000
7% Cum. Pref. stock—	
Series "A"	600,000
Series "B"	400,000
Com. stock (30,000 sh., no par)	1,862,832
Total	$4,335,201

[The bonds were all taken up within two days after issue.]

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	July 18	100	135	139	1½% quar.
Alpha Portland Cement Co. (preferred)**	July 18	100	105	....	1¾% quar.
Arundel Corporation (sand and gravel—new stock)	July 17	No par	36	36	30c quar. July 1
Arundel Corporation	Feb. 11	50	112	113½	
Atlas Portland Cement Co. (common)**	July 18	No par	53	55	50c quar.
Atlas Portland Cement Co. (preferred)**	July 18	33⅓	43	....	2% quar. July 1
Bessemer Limestone and Cement Co. (common)‡	July 17	....	135	150	1½% quar. July 1
Bessemer Limestone and Cement Co. (preferred)‡	July 17	....	106	110	1¾% quar. July 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	July 17	....	130	140	8% annual
Boston Sand and Gravel Co. (common)	June 26	100	75	75	2% quar. July 1
Boston Sand and Gravel Co. (preferred)	....	....	....	....	1¾% quar. July 1
Boston Sand and Gravel Co. (1st preferred)	....	....	....	....	2% quar. July 1
Canada Cement Co., Ltd. (common)	July 13	100	102½	103	1½% quar. July 16
Canada Cement Co. Ltd. (preferred)	June 30	100	113	....	1¾% quar. May 16
Canada Cement Co., Ltd. (serial bonds)	June 30	....	102½	....	3% semi-annual
Charles Warner Co. (lime, crushed stone, sand and gravel)	July 20	No par	22½	24	50c quar. July 10
Charles Warner Co. (preferred)	July 20	100	98	102	1¾% quar. July 23
Giant Portland Cement Co. (common)	July 17	50	27½	27½	
Giant Portland Cement Co. (preferred)	June 5	50	51¼	....	3½% semi-ann. June 15
Ideal Cement Co. (common)	July 20	No par	71	73	$1 quar. June 30
Ideal Cement Co. (preferred)	July 20	100	106	108	1¾% quar. June 30
International Cement Corporation (common)	July 21	No par	68¾	70	$1 quar. June 30
International Cement Corporation (preferred)	July 20	100	102½	104	1¾% quar. June 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Kelley Island Lime and Transport Co.	July 21	100	104½	105½	2% quar. July 1
Lawrence Portland Cement Co.**	July 18	100	105	....	2% quar.
Lehigh Portland Cement Co.	May 9	50	70	72	1½% quar. Apr. 1
Michigan Limestone and Chemical Co. (preferred)	....	100	....	....	1¾% quar. July 15
Missouri Portland Cement Co.	July 21	25	69¾	70½	31½c quar. June 1; 25c ex. June 1
Missouri Portland Cement Co. (serial bonds)	May 29	....	104½	104½	3¼% semi-annual
Pacific Portland Cement Co., Consolidated	July 18	....	80½	....	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)	July 3	100	100	100	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	July 21	10	8	8¾	
Petoskey Portland Cement Co.*	July 21	10	8½	9½	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	....	100	....	....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	July 20	100	98	....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)	July 20	100	70	....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)	July 20	No par	70	....	1½% quar. Aug. 1
Sandusky Portland Cement Co. (common)*	July 21	100	....	110	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds)	July 18	....	....	....	6% annual
Santa Cruz Portland Cement Co. (common)	July 18	50	....	....	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	....	120	
United States Gypsum Co. (common)	July 21	20	164	164⅞	2% quar. June 30; $1 ex. June 1
United States Gypsum Co. (preferred)	July 17	100	115	116	1¾% quar. June 30
Universal Gypsum Co. (common)†	July 22	No par	20	23	
Universal Gypsum Co. (1st mortgage 7% bonds)†	July 22	....	99	(at 6½%)	
Wabash Portland Cement Co.*	July 21	50	60	100	
Wolverine Portland Cement Co.	July 10	10	11½	11½	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York.
†Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio.

Editorial Comment

Congratulations All Around!

Organizations of producers of sand, gravel, stone and slag are showing commendable enthusiasm in the promotion of their particular variety of aggregate—urged on obviously, by the reported activities of each other group. Such enthusiasm is very much to be desired by all concerned, users as well as producers. It is something ROCK PRODUCTS has devoted much of its editorial labors to bring about for several years. For it has always been a mystery to us how any man could devote his life to producing and marketing any basic material of construction without wanting to know as much about it as the man who uses it.

Consequently, with a sincere desire to be of genuine service to subscribers and readers in these industries, ROCK PRODUCTS has two principal objectives: (1) To create a desire for this knowledge of their products by producers; (2) to furnish at least some of the desired information in regard to the properties and uses of the products and some specific information in regard to their production on a profitable commercial scale.

Naturally, we are pleased and gratified to see results, however much or little our editorial efforts may have had in bringing them about; for we would not be sincere in our efforts to enthuse producers with a desire for a greater knowledge of their products if we were not now gratified at the progress they are making. We certainly have tried our hardest to make the leaders in the industries see that the most profitable trade association activities are research and promotion, and we are happy to see those aims accepted now by all.

Moreover, we have not lost sight of the fact that all these industries are from the nature of things part of one big family of industry and that neither ROCK RRODUCTS nor the industries it serves will ever be real gainers by useless controversy and uncontrolled, unintelligent competition.

Having labored more or less successfully for many years to help eliminate cut-throat competition between members of the same group, it would certainly be very foolish to encourage similar competition between larger and more powerful organized groups of producers of rival materials. But from our vantage point of neutrality and close personal contact with the leaders in all three rival groups and with representative users of the materials, we have no fears for the future of any one of the three industries. We venture to predict that ten years from now their relative positions in point of production or popularity will be little changed from that of today—thanks to the operation of economic law over which none of us has any control.

Consider aggregates for portland cement concrete. Neither stone, nor gravel nor slag has a monopoly of desirable qualities and virtues; and the qualities of the one merge into those of the other by imperceptible degrees. There is only one all comprehensive specification that each and all must meet—the specification of ultimate economy. In engineering structures of all kinds that is a definite thing, determined by experience and calculation for the particular purpose desired.

The determining factors in the selection of the concrete aggregate may be low first cost, uniformity, density, porosity (lightness), hardness, minimum voids, availability in quantities desired or other consideration, depending entirely upon many things entirely outside of the control of the producer of aggregates. No one aggregate has all these virtues. Cost in most cases is a matter of the distance hauled; uniformity is not a sole virtue of stone since many single limestone quarry faces often expose stone of a great variety of physical properties, and of entirely different geological formations, and some gravel deposits are at least 75% uniform in being composed of hard limestone, or of granite or some other rock of uniform composition. So may all the other physical characteristics vary, not necessarily as between stone, gravel and slag; but as between one quarry and another quarry, or one gravel pit and another, or between one slag dump and another slag dump.

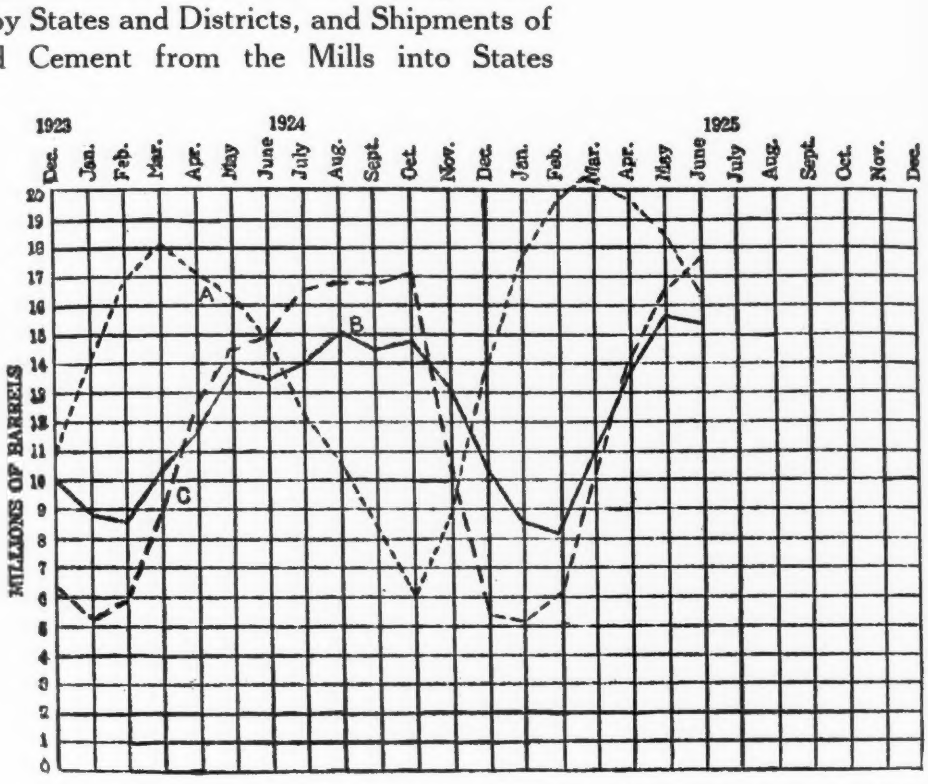
Taking all these points into consideration (just as you will later on, if not now), while we are expecting to see these rival industries take a much more aggressive attitude toward each other, we also expect it will ultimately be a more tolerant one. After all, those of us who get joy out of our work get that joy only through the zest of healthful, clean competitive efforts. If we all play the game in a sportsmanlike way, we shall all enjoy it, and we shall all be the better business men for it; and, let us not overlook, we are all going to know more about aggregates before the debate is closed. So more power to all of you producers, and may the Lord of Hosts help "us editors" to keep neutral and help us to continue to encourage the game along lines helpful to all—not forgetting the ultimate consumer, the public.

Portland Cement Output in June

With Estimates of Total Cement Output and Value, by States and Districts, and Shipments of Portland Cement from the Mills into States

SHIPMENTS of portland cement during the month of June were the highest ever recorded in the United States for any month, according to statistics compiled by the Bureau of Mines, Department of Commerce. Production of this commodity also approached a record mark, the month's output having been exceeded only by that of May, 1925. Portland cement stocks show a seasonal decline, but are still at high levels, and are over 9% greater than in June, 1924. The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are based mainly on the reports of producers of portland cement. The June, 1925, totals include estimates for one plant.

Total production for the month amounted to 15,387,000 bbl. as compared with 15,503,000 bbl. in May and 13,538,000 bbl. in June, 1924. Shipments totaled 17,501,000 bbl. as compared with 16,735,000 bbl. in May and 15,036,000 bbl. in June of the preceding year.



(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories

Clinker Stocks

Stocks of clinker, or unground cement, at the mills at the end of June, 1925, amounted to about 7,928,000 bbl. compared with 9,053,000 bbl. (revised) at the beginning of the month.

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during April and May, 1924 and 1925:

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN MAY, 1925*

Exports to	Barrels	Value
Canada	2,051	$ 6,763
Cuba	22,815	54,156
Other West Indies	6,287	18,609
Mexico	13,702	39,211
Central America	12,651	33,014
South America	24,142	76,536
Other Countries	3,737	22,556
	85,385	$250,845

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN APRIL AND MAY, 1924 AND 1925, IN BARRELS*

Shipped	April 1924	April 1925	May 1924	May 1925
Alabama	162,471	191,451	129,432	185,314
Alaska	231	709	637	0
Arizona	30,146	31,264	33,469	32,749
Arkansas	105,078	94,695	75,258	87,340
California	899,357	1,027,744	1,044,824	1,081,945
Colorado	111,833	131,363	141,894	125,744
Connecticut	143,013	160,616	166,717	177,292
Delaware	38,393	41,573	42,874	28,892
District of Columbia	55,800	70,765	51,807	103,996
Florida	140,291	261,180	170,110	313,846
Georgia	114,026	112,250	117,426	127,545
Hawaii	5,478	2,250	1,979	5,608
Idaho	30,538	28,393	28,199	28,613
Illinois	1,366,987	1,467,815	1,421,534	1,790,601
Indiana	454,111	433,996	523,774	569,436
Iowa	254,796	284,477	421,523	346,484
Kansas	248,942	232,220	247,164	242,880
Kentucky	156,403	174,795	145,624	195,351
Louisiana	140,357	108,250	106,977	99,402
Maine	34,998	36,163	45,512	38,435
Maryland	163,161	207,844	157,933	231,935
Massachusetts	309,111	344,406	364,354	374,243
Michigan	655,933	859,815	989,217	1,140,027
Minnesota	240,635	321,854	404,999	425,473
Mississippi	41,698	48,174	48,772	47,573
Missouri	392,769	489,316	391,946	652,330
Montana	23,446	23,030	28,421	28,170
Nebraska	153,517	180,951	154,977	198,333
Nevada	7,625	10,767	8,480	11,676

Shipped	April 1924	April 1925	May 1924	May 1925
New Hampshire	35,556	39,906	37,609	36,814
New Jersey	537,307	722,751	593,922	721,605
New Mexico	24,154	19,699	37,588	17,141
New York	1,558,728	1,717,441	1,710,784	2,028,808
North Carolina	232,887	277,616	319,454	289,056
North Dakota	25,531	38,937	29,414	47,789
Ohio	752,723	894,683	863,045	1,054,230
Oklahoma	269,777	201,886	264,611	235,096
Oregon	120,593	101,661	113,812	129,048
Pensylvania	954,720	1,250,501	1,093,389	1,482,560
Porto Rico	0	0	0	0
Rhode Island	56,400	79,063	73,437	72,914
South Carolina	49,837	65,806	51,285	74,198
South Dakota	37,602	57,039	49,995	66,445
Tennessee	147,706	133,037	155,684	163,812
Texas	389,892	401,517	359,570	373,605
Utah	45,073	33,469	62,439	41,447
Vermont	23,082	25,353	28,991	24,178
Virginia	179,862	160,139	156,109	154,167
Washington	167,640	180,845	192,570	265,735
West Virginia	147,927	134,357	149,396	140,992
Wisconsin	377,659	358,379	474,104	507,654
Wyoming	22,017	19,981	40,153	32,466
Unspecified	69,520	34,875	139,036	8,023
	12,707,337	14,327,067	14,462,230	16,659,016
Foreign Countries	63,663	66,933	88,770	75,984
Total shipped from cement plants	12,771,000	14,394,000	14,551,000	16,735,000

*Includes estimated distribution of shipments from three plants for April and May, 1924; and from four plants for April and May, 1925.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JUNE, 1924 AND 1925, AND STOCKS IN MAY, 1925, IN BARRELS

Commercial District	Production—June 1924	Production—June 1925	Shipments—June, 1924	Shipments—June, 1925	Stocks at end of June 1924	Stocks at end of June 1925	Stocks at end of May, 1925*
E'n Penn., N. J. & Md.	3,301,000	3,554,000	3,945,000	4,340,000	3,521,000	3,321,000	4,106,000
New York	696,000	809,000	906,000	986,000	1,028,000	986,000	1,164,000
Ohio, W'n Penn. & W. Va.	1,282,000	1,587,000	1,526,000	1,839,000	1,639,000	1,715,000	1,966,000
Michigan	899,000	1,140,000	1,093,000	1,320,000	571,000	1,065,000	1,245,000
Wis.,† Ill., Ind. & Ky.	2,044,000	2,441,000	2,209,000	2,553,000	2,356,000	3,106,000	3,218,000
Va., Tenn., Ala. & Ga.	939,000	1,176,000	956,000	1,369,000	753,000	418,000	611,000
E'n Mo., Ia., Minn. & S. Dak.‡	1,444,000	1,461,000	1,524,000	1,720,000	2,410,000	2,808,000	3,067,000
W'n Mo., Neb., Kans. & Okla.	939,000	1,147,000	840,000	1,095,000	1,195,000	1,610,000	1,558,000
Texas	390,000	389,000	401,000	444,000	298,000	203,000	258,000
Colo. & Utah	279,000	216,000	275,000	221,000	188,000	344,000	350,000
California	992,000	1,073,000	1,010,000	1,123,000	365,000	423,000	473,000
Ore., Wash. & Mont.	333,000	394,000	351,000	491,000	579,000	327,000	424,000
	13,538,000	15,387,000	15,036,000	17,501,000	14,903,000	16,326,000	18,440,000

*Revised. †Began producing and shipping June, 1924. ‡Began producing December, 1924, and shipping January, 1925.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS

Month	Production 1924	Production 1925	Shipments 1924	Shipments 1925	Stocks at end of month 1924	Stocks at end of month 1925
January	8,788,000	8,856,000	5,210,000	5,162,000	14,155,000	17,656,000
February	8,588,000	8,255,000	5,933,000	6,015,000	16,815,000	19,689,000
March	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,469,000
First Quarter	27,746,000	28,145,000	20,138,000	21,456,000	....	....
April	11,726,000	13,807,000	12,771,000	14,394,000	17,159,000	19,877,000
May	13,777,000	15,503,000	14,551,000	16,735,000	16,403,000	*18,440,000
June	13,538,000	15,387,000	15,036,000	17,501,000	14,903,000	16,326,000
Second Quarter	39,041,000	44,697,000	42,358,000	48,630,000	....	....
July	14,029,000	....	16,614,000	....	12,319,000	....
August	15,128,000	....	16,855,000	....	10,666,000	....
September	14,519,000	....	16,827,000	....	8,404,000	....
Third Quarter	43,676,000	....	50,296,000	....	....	....
October	14,820,000	....	17,160,000	....	6,073,000	....
November	13,141,000	....	10,289,000	....	8,928,000	....
December	10,435,000	....	5,506,000	....	13,913,000	....
Fourth Quarter	38,396,000	....	32,955,000	....	....	....
	148,859,000	....	145,747,000	....	....	....

*Revised.

IMPORTS AND EXPORTS*

Imports of hydraulic cement by countries, and by districks, in May, 1925

Imported from	District into which imported	Barrels	Value
Belgium	Massachusetts	6,803	$ 9,976
	Florida	8,168	11,169
	Los Angeles	53,313	68,823
	San Francisco	22,335	42,189
	Oregon	17,527	28,463
	Washington	19,826	37,256
	Total	127,972	$197,876
Denmark	Porto Rico	14,852	20,211
Germany	New Orleans	894	944
Japan	Hawaii	500	813
Norway	Maine and New Hampshire	3,991	6,381
	Florida	15,877	25,427
	New Orleans	22,811	35,307
	Total	42,679	$ 67,115
	Grand Total	186,897	$286,959

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1924 AND 1925

Month	Imports 1924 Barrels	Imports 1924 Value	Imports 1925 Barrels	Imports 1925 Value	Exports 1924 Barrels	Exports 1924 Value	Exports 1925 Barrels	Exports 1925 Value
January	153,839	$ 250,799	229,838	$361,098	88,586	$ 252,497	71,596	$207,547
February	162,930	219,588	119,077	206,308	62,606	194,110	56,249	181,356
March	160,517	254,745	218,054	374,839	91,224	254,687	65,248	200,410
April	148,137	227,300	197,686	280,826	83,200	229,183	89,508	263,831
May	161,304	232,950	186,897	286,959	88,850	262,290	85,385	250,845
June	196,655	283,112	(†)	(†)	74,064	229,852	(†)	(†)
July	108,944	181,111	....	....	60,139	186,073	....	....
August	192,634	305,690	....	....	85,883	251,904	....	....
September	138,369	232,991	....	....	69,470	206.921	....	....
October	214,987	337,199	....	....	79,180	253,479	....	....
November	198,806	305,598	....	....	42,490	130,519	....	....
December	173,814	285,481	....	....	52,851	163,639	....	....
	2,010,936	$3,116,564	....	....	878,543	$2,615,154	....	....

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN MAY, 1925

	Barrels	Value
Alaska	978	$3,247
Hawaii	5,144	9,721
Porto Rico	19,155	42,728
	25,277	$55,696

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.
†Imports and exports in June, 1925, not available.

High Alumina Cement for 24-Hour Tests of Aggregates

AS positive results on tests of fine and coarse aggregates cannot be obtained in less than 28 days by the present methods of testing and as this interval of time often causes a troublesome delay, experiments have been conducted recently using high alumina cement briquets for the tests and results of these tests at 24 hours compared with those obtained on portland cement briquets of the same mix at the end of 28 days. In the *Engineering News-Record* of June 18 was an article giving the results of such tests conducted and reported by Searcy B. Slack and J. E. Boyd of the State Highway Department of Georgia.

Tensile strength tests on briquets of 1:3 mortar were conducted, briquets of ordinary portland cement, standard Ottawa sand and of portland cement and sand to be tested were made in accordance with usual practice. At the same time briquets of alumina cement and standard Ottawa sand and of alumina cement and sands to be tested were made. Strength tests were made on the portland cement briquets at 28 days and on the alumina cement briquets at 24 hours. The tests showed a fair agreement between the strength ratio between briquets of standard Ottawa sand and sands being tested, using either portland or alumina cement.

The breaks of the alumina cement briquets showed that the sand grains were broken through demonstrating that the cement is sufficiently strong to test the sand. Frequenly when portland cement is used, especially in the 7 day test, the breaks show only a few broken sand grains.

Compressive strength tests were also made using for coarse aggregate a rounded quartz gravel passing a ½-in. screen and retained on a ¼-in. screen. All concrete was mixed in the proportion of one part cement, two parts sand and four parts gravel. Test cylinders were 3-in. in diameter and 6 in. long. The water cement ratio used was 50%. Cylinders of alumina cement, Ottawa sand and gravel at 24 hours had an average compressive strength of 3,904 lb. per sq. in. Cylinders of portland cement, Ottawa sand and gravel at 28 days had a compressive strength of 2,592 lb. per sq. in. The ratio of compressive strength between cylinders of portland cement concrete at 28 days and alumina cement concrete at 24 hours was 62.5% for Bull Creek sand and gravel and 85% for Ottawa sand and quartz gravel.

There has been a notable discrepancy in the reports on compression tests from different laboratories, this is attributed to use of slightly different water-cement ratios.

The conclusions drawn were that the data are not sufficient to justify definite conclusions at this time, however, the results indicated that a 24-hour test of concrete aggregates is feasible and that the results of these tests are comparable to the results obtained with the present 28-day test.

New England Lime Company Under New Ownership

J. King McLanahan and Bernard L. McNulty, Leading Figures in the New Organization

ONE of the most important transactions in the history of the American lime industry was consummated on Monday, July 13, when J. King McLanahan and associates purchased for cash the assets of the New England Lime Co., Danbury, Conn., from A. N. Griffin and associates for a price said to be in the neighborhood of $3,000,000.

The property was taken over by a new company incorporated under the laws of Delaware. The original company is a New York corporation. Details of the bond issue and the financial status of the organization are given elsewhere on our Financial News page.

The company operates in western Connecticut, Massachusetts and Vermont, where

J. King McLanahan, president of the New England Lime Co.

it owns deposits of over 50,000,000 tons of high calcium and magnesium limestone. The high calcium quarries and plants are at Adams, Rockdale and New Lenox (Mass.) and North Pownal, Vt., and the magnesium limestone quarries and plants are at Canaan, New Milford and Redding, Conn. These physical properties have been appraised at $3,600,000. The capacity of the present plants, two of which are rotary kiln plants, is 3500 bbl. (280-lb.) daily.

Besides its well-known brand of chemical and building lime ("Nelco"), the company also produces whiting and asphalt filler (ground limestone).

The owners and managers of the new company are some of the best known men in the lime industry. J. King McLanahan, for many years treasurer and general manager of the American Lime and Stone Co., Bellefonte, Penn., and now vice-president and treasurer of the Marblehead Lime Co., Chicago, is president. Bernard L. McNulty, president of the Marblehead Lime Co., Chicago, is vice-president. A. V. A. Felton is vice-president in charge of sales. He has been in active charge of sales for the original New England Lime Co. O. J. Vanderpool, formerly salesmanager of the Palmer Lime and Cement Co., New York City, is assistant to the vice-president in charge of sales. R. S. Peotter, secretary of the Marblehead Lime Co., Chicago, is secretary; Willits Pollock, Milwaukee, Wis., banker, is treasurer, and the directors, besides Messrs. McLanahan, McNulty, Peotter, Felton and Pollock, are Granville Whittlesey, Stanford, Conn., lawyer, and Russell Jackson, Milwaukee, Wis., lawyer.

The headquarters of the new company are at Pittsfield, Mass., where Mr. McLanahan is temporarily located.

Interdepartmental Conference on Chemical Lime

BECAUSE of its cheapness, lime is being used more and more as the basic raw material in a number of chemical industries. It is being utilized in many different manners, and economy demands that in so far as possible the lime used shall have the properties desired for the particular purpose. The user wishes to know what kinds of lime are available and the producer the quality of lime demanded in the various industries. This information can be made available by the preparation of specifications, and this is the purpose of the United States Interdepartmental Conference on Chemical Lime. This conference is composed of representatives of the Geological Survey, of the Interior Department; Bureau of Soils, Bureau of Chemistry, and Fixed Nitrogen Laboratory of the Department of Agriculture, the Chemical Warfare Service, of the War Department; and the Bureau of Mines and Bureau of Standards, of the Department of Commerce. To date recommended specifications for the following purposes have been issued as circulars of the Bureau of Standards and may be obtained from the Superintendent of Documents at 5 cents

Bernard L. McNulty, vice-president of the New England Lime Co.

per copy. Quicklime and Hydrated Lime for Use in the Cooking of Rags for the Manufacture of Paper; Limestone, Quicklime, and Hydrated Lime for Use in the manufacture of Glass; Quicklime for Use in Causticizing; Limestone and Quicklime for Use in the Manufacture of Sulhphite Pulp; Quicklime and Hydrated Lime for Use in the Manufacture of Sand-Lime Brick; Quicklime and Hydrated Lime for Use in the Manufacture of Silica Brick; Ceramic Whiting; Quicklime and Hydrated Lime for Use in the Absorption of Carbon Dioxide; Quicklime and Hydrated Lime for Use in the Purification of Water; Limestone, Quicklime, and Hydrated Lime for Use in the Manufacture of Sugar; Quicklime and Hydrated Lime for Use in the Manufacture of Calcium Arsenate. Several other specifications are in preparation, including lime for use in the manufacture of soap.

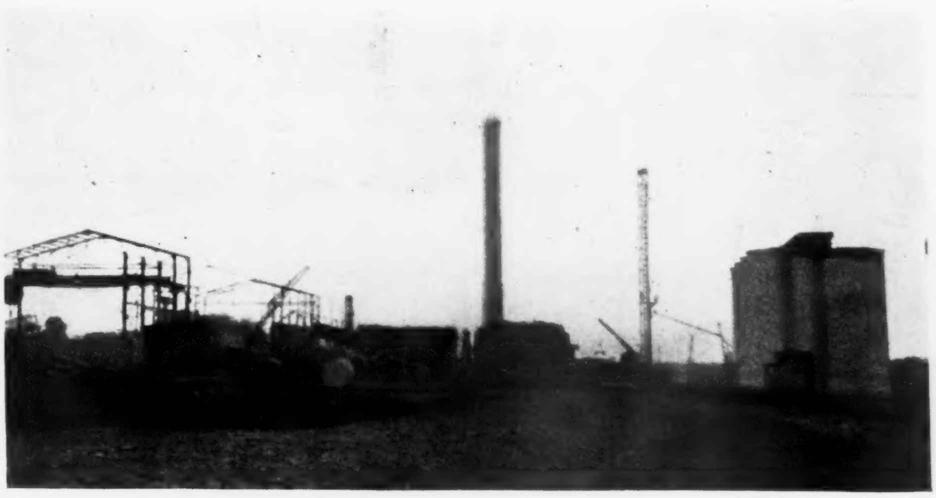
Geology of the Greatest Cement Producing District

Professor Peck of Lafayette College Tells How the Rocks from Which Cement Materials Are Taken Were Laid Down

By Edmund Shaw
Editor Rock Products

ONE who is interested in the rock products industries might profitably spend weeks in the Easton-Bethlehem-Allentown section. I had only parts of two days, but the glimpses of the country and its industries gained in that short time seem worth recording.

The reader probably knows that Northampton county alone, in this section, produces about one-fourth of all the cement made in the United States. But that is not the end of the story. The same formation that holds the cement rocks also holds the wonderful slate beds of Bangor and Pen Argyl. Talc is a product of the oldest rocks, and lime, crushed stone and rare building stones have been, or are at the present time, produced, not to speak of the metal producing and working industries.



New plant of the Lehigh Portland Cement Co. near Easton, Penn., as it appeared on July 8

Naturally in a country where practically every industry depends upon its geology, one is anxious to know something of what is below the surface. O. M. Graves of the General Crushed Stone Co., which has its headquarters at Easton, was kind enough to arrange a meeting with F. B. Peck, the head of the geological department at Lafayette college, which is in Easton, and an authority (or perhaps the authority) on the geology of the section.

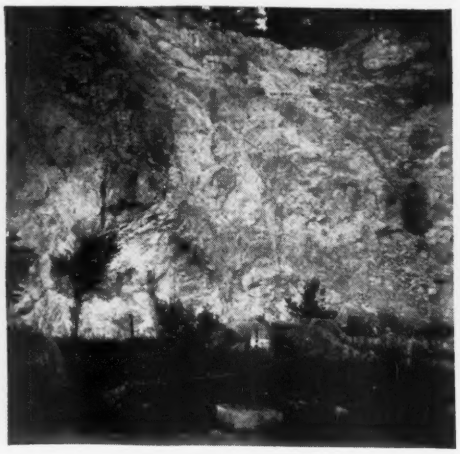
"The oldest rock exposed near here," said Professor Peck, "is at Chestnut hill ridge, a short distance up the Delaware. A part of the ridge is called Marble hill, because marble has been quarried from it. The rocks have been metamorphosed and are greatly changed from their original form, the limestones to marbles and the igneous rocks to gneisses. Three gneisses, two acid and one basic have been identified. All are pre-Cambrian."

One may pause here to note that pre-Cambrian rocks are pretty old, even as geologists consider age. There was life in the time they were laid down, but only life of the simplest forms, *Cryptozoon*, the marine algae to represent the vegetable kingdom and worms and sponges to represent the animal. Some writers claim that these rocks were laid down 250,000,000 years ago.

"Above these," to quote the professor, "is the bed of dolomite which you had better define as Cambro-Ordovician; that is, belonging to both the Cambrian and Ordovician periods. (The fossils which show this are more complex in form than those of the pre-Cambrian rocks, such as the trilobites and cephalopods, not so different from some of the shell fish of the present day). This dolomite has not been of as great commercial importance as some other rocks in this section, but it has been worked considerably to produce crushed stone.

"On top of this dolomite lie the very pure calcium limestones of the Ordovician period. The famous Lebanon limestone belongs to this series. And with this are associated the Ordovician slates. The depth of these deposits here is about 2000 ft. altogether. Both limestone and slate were marine deposits, the slates being the deposits of mud and silt that were brought down from the land and deposited close to the shore above

Raw-grind department and kiln house of the Edison Cement Manufacturing Co.



Left—Chestnut Hill ridge. The Delaware flows through a fault in the ridge at this point. Center and right—Talc quarry and crushing plant of C. K. Williams & Co.

the lime. Naturally such deposits were not all of the same thickness and we find the slates very thick in some places and pinching out altogether in others. It is this mixture of high calcium limestone and slate that is responsible for the cement industry here. In places the lime and slate are so united that they can be quarried together and form a 'natural' cement rock. In other places some clay must be added. But it is the presence of these beds of limestone and slate that has made possible the great cement industry of the region.

"The slate beds which lie close above and which are quarried so extensively at Bangor and Pen Argyl form one of the most notable deposits of slate in the world. It is not alone their depth and area that is remarkable; it is the quality of the slate. The cleveage is so perfect that the slate may be split into leaves as thin as ordinary cardboard." And the professor explained that he had seen slate splitters at Bangor start with a piece an inch wide and by repeated splittings end up with 32 pieces each of which was almost exactly of the same width.

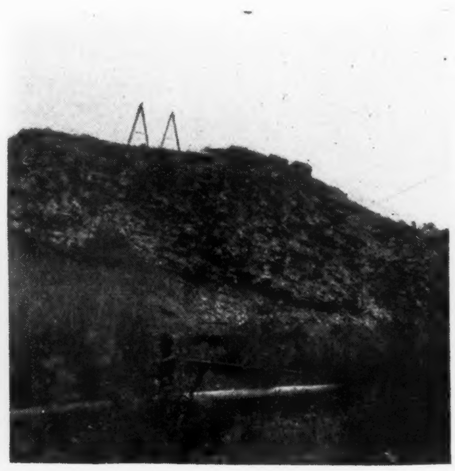
"In the old, pre-Cambrian rocks, of which I spoke at first, talc is found. The old limestones have been sheared over to tremolite and the tremolite to talc. You can see the talc quarry a short distance up the river. There are also serpentines in these rocks and they were at one time quarried as ornamental building stones and sold under the name of 'Verdolite.' Several buildings in Easton have interior trim of this stone and I saw some once in a bank building in Ontrio when I was visiting in Canada."

The "circle" in Easton. The Alpha offices are in the tall building

I was driven out in the afternoon to see some of the things of which the professor had spoken. The road (one of the most beautiful in the country, and a favorite way to Delaware Water Gap) follows the river for miles. Not long after we left town we saw Chestnut hill on the other side of the river, for the river flows through the ridge here in a gap that was caused by a fault. On the same side of the river as the road a little further on is the talc quarry and plant of C. K. Williams and Co.

One would have liked to have stopped to visit this operation which appears to be conducted on up-to-date lines, with air drills for breaking the rock and a neat looking crushing plant to prepare it for the market. But time pressed so we drove on, pausing for a moment to take a picture of an old-fashioned lime kiln by the roadside. How old, I do not know, but it might have stood for a century, as lime kilns of that sort were in use a hundred years ago and this was substantially enough built to stand the storms of a hundred winters. Another lime kiln very much like it stands farther down the road.

Shortly before we reached Martin's Creek



Left—Old lime kiln on the road to Martin's Creek. Center—Kilns and stack of the new Lehigh plant. Right—Piles of slate waste near Bangor, Penn.

we came on the new plant which the Lehigh Portland Cement Co. is building. Construction seems to be well along. The big concrete stack and the silos for the finished product are completed, the kilns are being placed and the steel framework for the grinding houses and other buildings are being erected. It is evident that this is to be one of the most modern plants in the district.

When we came to Martin's Creek, where one of the Alpha plants is located, it was raining hard so we kept on to Bangor, hoping that the weather would have cleared by the time we got there. But it was a vain hope. The rain poured even harder and all we could see of the slate industry was represented by piles of waste slate like young mountains, deep holes into which the rain forbade us to look and steel cables running here and there like the lines of a spider web.

Another drive took me to the plant of the Edison Cement Manufacturing Co. over in New Jersey.

The Edison is a good sized plant, as are many of the plants in this region, producing about 2,800,000 bbl. of cement a year. It would require only 50 such plants to make all of the cement that was produced in the United States last year.

Looking back on this visit and reflecting on Prof. Peck's talk, gives one an odd sensation as he thinks of all that it has taken to produce the raw material for these industries, all the erosion of the land and the carrying of silts to the sea, the solution of lime and its precipitation in quiet waters and the work of animal life. Man is indeed, as he has been called, "the heir of all the ages," not alone the clock-tick of geological time that we refer to as "historical," but the heir of all that the sun, the wind, the water and the ice have done since the first ocean waves beat upon the hot rocks of a new-made world.

International Cement Corporation's Expansion in the South

Former Phoenix Birmingham Plant Will Be Operated Without Interruption; New Orleans Plant Will Be Erected with Initial Installation of Two Kilns

THE International Cement Corp., New York, has purchased the southern properties of the Phoenix Portland Cement Co., as noted in the July 11 issue of Rock Products. Control passed to the new owners on July 1.

The properties will be operated by the Alabama Portland Cement Co., which was organized for the purpose. This company was incorporated in Delaware.

H. Struckmann, president of the International, is president of the new company. J. W. Johnston is vice-president and manager, C. C. Duff, treasurer, and S. C. McCurdy, sales manager.

Mr. Johnston was formerly an assistant general manager of the Portland Cement Association, with offices in New York and in charge of the Boston, New York and Philadelphia districts.

Mr. Duff has been with the present management of the International for the past 16 years, having served in Texas, Argentine and New York.

Both Mr. Johnston and Mr. Duff will reside in Birmingham.

Mr. McCurdy, who came to Birmingham as sales manager when the Phoenix began business, continues in the same capacity with the new owners.

The International system now consists of nine companies with ten plants having a combined capacity of 12,000,000 bbl. annually.

The Virginia Portland Cement Co. is now building a new plant at Norfolk, with an annual capacity of about 1,100,000 bbl. This plant will be in operation by the latter part of August or early September.

The Alabama Portland is the second new company to be added in less than a month's time. The Indiana Portland was purchased about the middle of June.

The northern properties of the Phoenix Portland Cement Co., at Nazareth, Penn., are not affected by the purchase.

The following announcement, according to *The Dixie Manufacturer,* was made by Mr. Morton regarding the sale:

"The Phoenix Portland Cement Co. has sold as of July 1, all of its interests at Birmingham and New Orleans to the Alabama Portland Cement Co., a member of the International system.

"There will be no interruption in the operation of the plant and all the orders of the Phoenix company will be filled by the Alabama Portland Cement Co.

"Holger Struckmann will be president of the Alabama company and J. W. Johnston will be vice-president and manager, making his headquarters in Birmingham. S. C. McCurdy will continue as sales manager. The majority of the Phoenix organization will remain in their present capacities.

"The Phoenix Portland Cement Co. is not selling its plant at Nazareth, Penn., but has arranged to increase immediately this capacity 60%."

The following statement was issued July 1 by H. Struckmann, president:

"The Alabama Portland Cement Co. will operate under the same policies that are followed by the other eight companies in International system. These policies have been developed during more than 20 years experience in the manufacture and distribution of cement.

"Unbounded faith in the South is demonstrated by the addition of this its largest cement mills, to the International system. With producing mills at Birmingham, Dallas and Houston and a plant nearing completion at Norfolk, the South is thus provided with an annual capacity of over 5,000,000 bbl. of home production.

"An inflexible part of the policy followed by this company is 'to deal with each customer as though both buyer and seller were members of the same organization.' We confidently hope that by following out this policy, our product, Lone Star cement, will merit the same high regard in this territory as it now enjoys in those sections of the country where it is so well known today. The new management is determined to produce a quality of cement for the people of Alabama and neighboring states as nearly perfect as present engineering knowledge and science can make it."

The new kiln at the North Birmingham plant of the Alabama Portland Cement Co. has been completed and by the latter part of this week or the first of next will begin production. Additional equipment for this kiln was installed some time ago and since then has been in operation. This new kiln increases the capacity of the plant to 2,000,000 bbl. annually.

The New Orleans properties will be under construction shortly with an initial installation of two kilns and will provide the Alabama company another strategically located plant in the South.

The offices of the Alabama Portland Cement Co. will be maintained on the 23rd floor of The Age-Herald building, Birmingham, Ala., but will be greatly enlarged and made the central directing point for the company's business in this section.

Death of T. J. Hyman

THOMAS JESSE HYMAN, secretary and treasurer of the Universal Portland Cement Co. and the Illinois Steel Co. and officer and director in other corporations, died July 4 at the age of 70. Mr. Hyman was born in Camanche, Iowa, on April 8, 1855. From 1876 to 1898 he was an officer in various railroad companies. He was a resident of Oak Park, Ill., since 1888 and was associated with the Illinois Steel Co. since 1899.

Illinois Crushed Stone Producers Reorganize

Producers Form a Mid-West Section of National Association

PRODUCERS of crushed stone in the state of Illinois met in Chicago on July 10 to organize the Mid-West section of the National Crushed Stone Association. There has been for a number of years a more or less active association of Illinois quarry owners known as the Illinois Crushed Stone Association, so that this is really a reorganization brought about by the desire to meet certain local problems, as well as to increase membership in the National Crushed Stone Association.

Illinois conditions are becoming something of a problem to producers from the fact that most of them depend very largely on state highway construction for the bulk of their tonnage. Great prepara-

Fred C. Murphy, secretary

tions were made by nearly all producers for an increased tonnage this year in expectation of the expenditure of a good share of the new $100,000,000 state bond issue. It seems now that a technicality in the law authorizing this bond issue will not permit letting contracts under it until all of the road work authorized by the previous $60,000,000 bond issue has been put under contract. There are various sections of the older bond issue roads which have not been put under contract because of right-of-way complications or grade-crossing elimination problems yet to be solved. The result is to delay expected road work for at least another year.

Col. O. P. Chamberlain, chairman

This and other local problems were discussed by the Illinois producers at their meeting. An executive committee was elected as follows: Chairman, O. P. Chamberlain, vice-president and general manager, Dolese and Shepard Co., Chicago; secretary, F. C. Murphy, secretary of the Brownell Improvement Co., Chicago; E. J. Krause, president, Columbia Quarry Co., St. Louis, Mo.; W. S. Sanborn, general manager, Lehigh Stone Co., Kankakee, Ill.; E. B. Taylor, Mid-West Crushed Stone Co., Greencastle, Ind.

Missouri Highway Commission May Foreclose Unless Stone Company Fulfills Contract

TROUBLES of the State Highway Commission in obtaining crushed stone from quarries at Gallatin and Smithville, Mo., which were equipped with highway department funds, reached a climax today (July 8) at a meeting of the commission at Hotel Jefferson when it was agreed to raise the price paid for stone from $1.25 to $1.75 a ton and give the company operating the plant six months probation before foreclosing on a deed of trust. W. R. Compton, St. Louis banker, and W. H. Cocke of St. Louis, two stockholders of the company who were present as its spokesmen, did not say positively they would accept the new agreement, but indicated a decision would be reached shortly.

The Consolidated Crushed Stone Company owns the quarries and the Highway Department advanced $225,000 to equip them on a contract to get back its investment out of the profit the company made in selling the stone for road building. The department's investment is secured by a $225,000 indemnity bond and a deed of trust to the land. After the company began operating it was discovered that stone up to highway department standard could not be obtained except by expensive stripping. Operations have dragged all summer. The company could not furnish stone at $1.25, except at a loss.

The supplemental agreement offered by the commission today besides raising the price requires the company to pay $10,000 a month in cash or credit for six months to wipe out the penalty for non-delivery, to furnish 1125 tons of stone a day and to offset a state outlay of $18,000 for additional machinery through the differential on stone furnished.—*St. Louis, Mo., Star.*

Research on the Dehydration Products of Gypsum

AN abstract of an article by T. Jung, *Z. Anorg, Chem. 142* (1925) appeared in the *Jour. Soc. Chem. Ind. 44B*, 284 (1925). This article gave results of researches made on the hydrated and anhydrous forms of calcium sulphate both natural and artificial by the X-ray method of Debye and Scherrer. All examinations gave results corresponding with either $CaSO_4.2H_2O$, $CaSO_4.\frac{1}{2}H_2O$ or $CaSO_4$. With regard to the gradual loss of water by the hemihydrate on heating at 200 deg. C. it was found that this process does not alter the lattice structure of the hemihydrate and that only at higher temperatures is the anhydrite structure formed. Technical stucco plaster (6.94% H_2O) consisted almost exclusively of the hemihydrate.

New Egyptian Cement Declares Dividend

AT the meeting of the board of directors of the New Egyptian Portland Cement Co., Detroit, Mich., on July 7, the usual 4% semi-annual dividend was declared, payable August 1, to holders of record July 20.

Conditions are considered very favorable for a most satisfactory year and a large increase in both production and shipments is reported.

Florida's First Cement Plant Planned

ANNOUNCEMENT has been made that a new portland cement plant is to be constructed in Florida. The following is taken from the *Tampa, (Fla.) Tribune:*

Construction of a $5,000,000 cement plant in Tampa, Fla., to start within the next 90 days has been announced by John L. Senior, president of the Peninsular Portland Cement Co., Cement City, Mich., and of Signal Mountain Portland Cement Co. and the Cowham Engineering Co., both of Chattanooga, Tenn.

The plant, which will be located somewhere along the Hillsborough Bay water front in Tampa, on Seaboard Air Line Ry. property, will have a capacity of 2,500,000 bbl. of cement annually, Mr. Senior announced. Cost of construction of the plant alone will surpass $5,000,000, he said, while considerations involved in obtaining the site for the concern will add considerably to the cost of the project.

Completion of the new cement plant will involve the employment of approximately 300 cement makers, it was stated. The annual payroll will exceed $1,000,000.

Although the exact site for the plant has not been decided upon, it will be located somewhere along Tampa Bay, either within or adjoining the city limits of Tampa. Agreements have been reached with the Seaboard railway whereby as much as 35 or 40 acres of railway property will be available for the plant. This was confirmed recently by Charles A. McKeand, general industrial agent for the railroad.

Simultaneous with announcement of the project, purchase of 1000 acres of rock and clay deposits six miles north of Brooksville, Fla., was revealed. Construction of a spur to the Brooksville supply is also under consideration.

Construction of the Tampa plant will be effected by the Cowham Engineering Co., a subsidiary of the cement interests. The engineering branch of the corporation has constructed nine plants for the Senior concern within the past 13 years, it was said recently, entailing an expense in excess of $20,000,000.

"The plant will be built," Mr. McKeand, general industrial agent for the Seaboard Ry., said, in confirming reports of the project. "Tampa has been under consideration as a probable site for the new plant for more than a year and a half. During that time, members of Mr. Senior's organization have not been idle. Everything was in readiness before the announcement was made, and even now some materials are ready for shipment to Tampa."

Mr. Senior, Mr. McKeand and other officials, who have conferred in Tampa frequently during the past year and a half, have left the city. They will return to complete plans for early start in construction on the new plant in the near future, it is said.

Colonel Boyden To Be Dean of Engineering in Ohio Northern University

PROBABLY every reader of ROCK PRODUCTS in the United States knows of Col. H. C. Boyden, lecturer for the Portland Cement Association and probably the larger part of them, have heard him speak. So they will be interested to know that he has accepted the position of dean of the engineering department of Ohio Northern University, Ada, Ohio.

Northern University is to be congratulated, not only in securing Colonel Boyden's services, but in picking a man of his type. For Colonel Boyden is not only a thorough engineer, he is also one of those rare men who knows how to impart a knowledge of engineering subjects to others and even to render his hearers enthusiastic about them. Except to producers of concrete materials and workers in concrete, the application of scientific principles to concrete mixing is a rather dry subject. Yet Colonel Boyden has been lecturing on it for years and holding the interest and attention of his audiences from the first word to the last, as everyone knows who has heard him speak.

Col. H. C. Boyden

Colonel Boyden is a native of Massachusetts and was graduated from Worcester Polytechnic Institute in 1894. He was engaged in railroad and highway construction work before the war and during the war he organized forces for the collection of military information in the United States. He is a member of the American Society of Civil Engineers and of the Society of American Military Engineers. Since the war he has delivered 1200 lectures on concrete and concrete engineering to colleges, technical societies and organization of business men, architects and engineers.

In the new program of expansion which Ohio Northern University is undertaking, special attention will be paid to the application of laboratory principles to field control and quality of concrete. Colonel Boyden has devoted all of his time since the war to these subjects. The other courses in engineering will be maintained at their present high standards.

Guadalupe Cement Plans and Proposed Financing

OFFERING of the securities of the Guadalupe Portland Cement Co., San Francisco, Calif., by local brokers is expected soon. The Guadalupe Portland Cement Co. holds properties within a few miles of San Jose, on the Southern Pacific R. R., which contain in large quantities all the necessary materials for the manufacture of portland cement.

It is understood that further development of these properties will be financed through the sale of an issue of first-mortgage bonds bearing 7% and an issue of 8% cumulative participating preferred stock. The total authorized capital of the company is $3,000,000.

The properties of the company have been appraised by the General Appraisal Co. to have sound conservative value of $4,032,860. In addition, the company will immediately construct a thoroughly modern plant at a cost of approximately $650,000 with a capacity production of 2500 bbl. per day. The company's lime and shale deposits are all concentrated within two miles of the railroad and plant, thereby affording low production costs.

Contracts have already been made to assure the sale on a most favorable basis, of over 50% of the maximum production of the plant. This will place the company immediately upon completion of the plant on an earning basis. With the tremendous growth in the uses of cement and the constantly increasing demand for this product in California, it is of unusual interest to find another large portland cement company commencing operations close to San Francisco to assist in satisfying the demand for this product.—*San Francisco (Calif.) Bulletin.*

Construction Started on Calaveras Cement Plant

THE Calaveras Cement Co. of San Andreas, Calif., has started actual construction on its new 2000 bbl. cement plant. The machinery contract has been let to the Allis-Chalmers Manufacturing Co., Milwaukee, Wis. The general contract for silos, packing plant and general concrete work has been let to the MacDonald Engineering Co., Chicago, Ill.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 20:

Central Freight Association Docket

11046. Crushed stone. Bloomville, Ohio, to Martel, Ohio. Present rate, 11½ cents; proposed, 90 cents per net ton.

11048. Gravel and sand (except blast core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica). Indianapolis, Ind., to Ingalls, Ind. Present rate, 75 cents per net ton; proposed, 65 cents per net ton.

11049. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica). Winona Lake, Ind., to Milford Junction, Ind. Present rate, 11½ cents; proposed, $1.04 per net ton.

11053. Crushed stone. Greencastle to Crawfordsville, Patricksburg, Bloomington, Lafayette, Vicksburg, Little Giant, Andromeda, Reynolds, Francesville, Michigan City and Hammond, Ind. Present rates: To Patricksburg, 81 cents; to Crawfordsville, 82 cents; to Bloomington, 90 cents; to Vicksburg and Lafayette, 95 cents; to Andromeda and Little Giant, 99 cents; to Francesville and Reynolds, $1.15, and to Michigan City and Hammond, Ind., $1.35 per net ton. Proposed: To Crawfordsville and Patricksburg, 70 cents; to Bloomington, 75 cents; to Lafayette and Vicksburg, 80 cents; to Little Giant, 85 cents; to Andromeda, 90 cents; to Reynolds, 95 cents; to Francesville, $1, and to Michigan City and Hammond, Ind., $1.20 per net ton.

11054. Gravel and sand (except blast, engine, core, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding or silica). Massillon, Ohio, to Painesville, Ohio, and Ashtabula, Ohio. Present rate, $1.40 per net ton; proposed, Painesvile, Ohio, $1.10, and to Ashtabula, Ohio, rate of $1.20 per net ton.

11067. Sand and gravel. Noblesville, Ind., to Tipton, Hobbs, Ellwood and Alexandria, Ind. Present rate: To Tipton, 70 cents and to other destinations 72 cents per net ton. Proposed: To Tipton, Ind., 60 cents; to Hobbs and Elwood, Ind., 65 cents, and to Alexandria, Ind., 70 cents per net ton.

11069. Ground slag. Hancock, Mich., to Detroit, Mich. Present rate, 36½ cents; proposed, $4.60 per net ton.

11073. Crushed stone. McVittys, Ohio, to Lebanon, Hageman, Montgomery, Kennedy Heights and Cincinnati, Ohio. Present rate, sixth class; proposed, $1.10 per net ton.

11075. Gravel and sand. Mechanicsburg Gravel Pit, Ohio, to Prospect, Owens, Marion and Morral, Ohio. Present rate, sixth class; proposed rate, 80 cents to Prospect and Owens, Ohio, and 90 cents per net ton to Marion and Morral, Ohio.

11083. Crushed stone and stone screenings. Carey, Ohio, to Arcadia and Findlay, Ohio. Present rate: To Arcadia, 70 cents per net ton, and to Findlay, Ohio, 9½ cents; proposed, 60 cents per net ton.

11084. Crushed stone. Bellevue, Bloomville, Gibsonburg, Maple Grove, Tiffin and Woodville to Erie R. R. stations—Summitt, Ashland, West Salem and Silver Creek, Ohio. Proposed, 80 cents per net ton.

11086. Sand and gravel. Killbuck, Ohio, to Chagrin Falls, Ohio. Present rate, 16 cents; proposed, $1 per net ton.

11145. Crushed stone. Sandusky, Gibsonburg, Maple Grove and Woodville, Ohio, to Zanesville, Ohio. Proposed, $1.10 per net ton.

11150. Sand and gravel. Richwood, Ohio, to Delaware, Ohio. Present rate, 80 cents per net ton; proposed, 70 cents per net ton.

11154. Sand and gravel. Massillon and Crystal Springs, Ohio, to Wooster, Ohio. Present rate, 60 cents per net ton; proposed, 70 cents per net ton.

11170. Sand and gravel. Kittanning, Penn., to Cleveland, Ohio. Present rate, 17 cents; proposed, $1.75 per net ton.

11171. Sand and gravel. West Ellwood Junction, Penn., to Allison, Masontown and Gray's Landing, Penn. Present rate, $1.85 per net ton; proposed, $1.60 per net ton.

11175. Crushed stone. McVittys, Ohio, to Arcadia, Ohio. Present rate, sixth class; proposed, $1 per net ton.

11176. Sand and gravel. Ft. Jefferson, Ohio, to Dixon, Ohio. Present rate, sixth class; proposed, 80 cents per net ton.

11178. Crushed stone. Lake Shore Quarry, Ohio, to Louisville, Ohio. Present rate, sixth class; proposed, $1 per net ton.

11186. Sand and gravel. Wolcottville, Ind., to Lima, Ohio. Present, 90 cents per net ton; proposed, 80 cents per net ton.

Illinois Freight Association Docket

453A. Sand and gravel. Carloads, minimum weight marked capacity of car from Palestine, Ill., to Ledford and Carrier Mills, Ill. Present, combination; proposed, $1.26.

3242. Molding sand. Carloads, minimum weight 90% of marked capacity of car from Sand Cut, Ill. (St. L. T. & E.). Rates in cents per net ton: Proposed, to O'Fallon, Ill., 113; Beckmeyer, Ill., 126; Sandoval, Ill., 126.

3272. Crushed limestone rock. Carloads, from Chicago Heights, Ill., to St. Louis, Mo. Present, 16 cents; proposed, $2.05 per net ton.

Southern Freight Association Docket

21439. Granite or stone, rubble or crushed. Carloads, minimum weight 60,000 lb., from Woodleaf, N. C., to Philadelphia, Penn. Present rate, 45 cents; proposed, $3.24 per ton 2000 lb. There is a large movement of stone, as described above, from Woodleaf to Philadelphia and shippers have requested rates made in line with rates from other North Carolina quarries, and it is proposed to establish rate made same as from Mt. Airy, N. C., viz., $3.24 per ton, 2000 lb.

21516. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Petersburg, Arundel Siding, Old Dominion Siding and Ellerslie, Va., to Ellet and Ashland, Va. Present rate, 94 cents per ton 2000 lb.; proposed, 82 cents per ton 2000 lb. Proposed rate is made with relation with rate obtaining from Nassaponax, Va.

21522. Gravel, when for federal, state, county or municipal authorities, from Camden, Tenn., to Byhalia and Victoria, Miss. It is proposed to cancel present rate of $1.24 per ton of 2000 lb. on gravel when for federal, state, county or municipal authorities, applying from Camden, Tenn., to Byhalia and Victoria, Miss., applying in lieu thereof lowest combination based on Memphis, Tenn.

21674. Slag. Carloads, minimum weight 90% of marked capacity of car, except when loaded to their visible capacity actual weight will govern, from Birmingham, Ala., and group and Alabama City, Ala., to Covington, Ga. Lowest combination now applies. Proposed: From Birmingham, $1.67; Alabama City, $1.58 per net ton based on the proposed Georgia-Alabama scale.

21687. Slag. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will apply, from Birmingham, Ala., and group to Mortz, Abbott and Theodore, Ala. Combination rates now apply. Proposed: To Mortz, $1.76; to other points named, $1.80 per net ton, made on basis of the proposed Georgia-Alabama scale less 10%.

21693. Stone, broken or crushed. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight shall govern. It is proposed to revise the present commodity rates from Hopkinsville, Ky., to stations on the St. Louis division of the L. & N. R. R. to be in line with those in effect from Sunlight, Ky.

Southwestern Freight Bureau Docket

5387. Stone from Wichita and Rosedale, Kans., to points in Oklahoma. To provide for joint application of rates now carried on pages 555 and 556 of S. W. L. Tariff No. 44M on artificial stone, carloads, minimum weight marked capacity of car, from Wichita and Rosedale, Kans., to all points in Oklahoma by assessing an arbitrary of 1 cent per 100 lb. Shippers claim rates are too high when compared with rates from St. Louis, Carthage, Mo., and Oklahoma shipping points and they therefore cannot compete with shippers at these points.

Limestone Transit Forbidden

AN order requiring the St. Louis-San Francisco to cancel tariffs, C. C. Nos. 8410 and 8474, purporting to give transit on limestone and shale produced at Lantry and Lawrence, Okla., converted into cement at Ada, Okla., has been recommended by Examiner Frank M. Weaver, in No. 16640, limestone into and cement out of Ada, Okla., on the ground that the provisions of the tariffs under investigation and suspension constitute unreasonable regulations and practices affecting interstate rates on cement from Ada, Okla. Weaver referred to the movement of stone into Ada and cement therefrom, as a fictional through-movement, which carried the through-movement theory on which bona fide transit rested to undue extremes.

The formal case is joined with I. and S. No. 2367, the case in which the Commission suspended the Frisco's tariff, I. C. C. 8474 pending investigation for report purposes. The former case, the examiner said, grew out of the Commission's order of January 31, 1925, instituting, on its own motion, an investigation into the lawfulness of Frisco I. C. C. No. 8410 proposing to establish transit at Ada. After that case was instituted the Frisco filed its I. C. C. No. 8474, the tariff named in the suspension docket case, with a view to clarifying the tariff which had caused the institution of the formal docket case. It was filed after the hearing in No. 16640 had been had.

Lantry and Lawrence are local stations on the Frisco, about 5.5 miles south of Ada, the point at which the Oklahoma Portland Cement Co. has a plant at which it converts the limestone and shale into cement. Ada is served by the Santa Fe, the Oklahoma City-Ada-Atoka Railway as well as the Frisco. The cement company, the report said, discovered the cement making deposit of stone at Lawrence in 1906. At that time Lawrence was only a railroad station, Ada being the nearest town. That fact and the further fact that the Frisco was willing to enter into a contract for the movement of rock from Lawrence to Ada, the examiner said, had a direct bearing upon the selection of Ada, instead of Lawrence, as the site of the cement company's plant. Under the contract the Frisco was willing to transport the rock to Ada for 8c per 100 lb. when loaded in cement company cars and 10c when loaded in railroad-owned cars. When General Order No. 28 came along the rates became 30c per 100. August 26, 1920 the 30c rate became 43c. That rate caused the filing of a com-

plaint with the Oklahoma commission. The Frisco was dissatisfied with the Oklahoma commission's order and took the matter to court. The supreme court established a rate of 16.875 with which the cement company was not satisfied. In answer to its appeals, the examiner said, the Frisco, October 28, 1914, made effective its I. C. C. No. 8410 which caused the institution of the instant formal docket case.

That tariff, the examiner said, provided, among other things, that charges on limestone and shale from Lantry and Lawrence to Ada should be collected on the basis of $6.60 per car of 80,000 lb. and $8.25 on a car of 100,000 lb. that upon reshipment of the product, cement, over the Frisco the inbound charges on the stone would be revised to the basis of 10c; that readjustment of inbound charges would be made at the end of each month, the inbound bills to be surrendered in support of claims for refund; that reshipment of the cement had to be made within one year from the date of the inbound movement of crushed limestone or shale; and that for the purpose of computing the readjustment of charges on the stone, 1165 lb. of cement would be considered the equivalent of 2000 lb. of stone. The later schedule, I. C. C. No. 8474, was published to correct errors, the examiner said. He said that in addition to the things provided for in the first schedule, the new tariff provided for an interstate rate of 6.5c and an intrastate rate of 3c, when the cement manufactured therefrom was shipped from Ada to interstate or state points on other than the lines of the Frisco and a rate of 3c in the event cement was not shipped out within a year. In discussing and disposing of the case the examiner said the Commission should say:

The provisions of both tariffs are vague, indefinite, and contradictory. However, the record definitely indicates that they were intended to restore in tariff form the substantial provisions of the contract of 1906 between the Frisco and the cement company. To give the movement of limestone or shale an interstate character, both tariffs attempt to create a so-called transit arrangement based upon a fiction that the movement of stone or shale to Ada forms only a portion of a through movement, the other portion being the movement of cement, a wholly different commodity, from Ada to interstate destinations.

For many years similar transit arrangements have applied in connection with the movement of such commodities as forest products, grain and grain products. However, the commission has heretofore disapproved all efforts of the carriers to establish transit on cement. Rules for storing and sacking cement, 78 I. C. C. 693, 88 I. C. C. 662. In the latter report, page 669, the commission said:

"Reason and the past experience of carriers with respect to other commodities convince us that, once established by respondent, transit on cement would rapidly spread. It is a matter of common knowledge that cement generally moves over comparatively short distances. The movements to the intermediate transit point would be correspondingly short. Therein lies a difference between cement and most other commodities upon which transit for storage is provided."

As to transit in general, the Supreme Court said in Central R. R. Co. vs. United States, 257 U. S. 247, 257:

"The practice is sometimes beneficial in its results: but it is open to grave abuses. To police it adequately is difficult and expensive. Unless adequately policed, it is an avenue to illegal rebates and seriously depletes the carrier's revenues. Railroad managers differ widely as to the policy of granting such privileges. The Commission clearly has power under section 1 of the Act to Regulate Commerce as amended to determine whether in a particular case a transit privilege should be granted or should be withdrawn."

Bearing in mind the fact that limestone and cement are two separate and distinct commodities, it would seem that the fictional through-movement theory, upon which all bona fide transit rests, is carried to undue extremes in the tariffs under investigation. It would be just as logical to assume that the movement of wool to a clothing factory and the movement of overcoats therefrom constitutes a through movement of one or the other of these commodities from the point of origin of the wool to the final destination of the overcoats.

As a matter of fact this commission has no jurisdiction over the movement of limestone or shale from Lantry and Lawrence to Ada. The question of whether a given movement is state or interstate commerce is dependent wholly upon the essential character of the movement itself. Under this well-established rule, the movement of limestone or shale from Lantry or Lawrence to Ada is purely intrastate commerce, and it can hardly be said that the tariffs under investigation change the essential character of the traffic. Arkadelphia Co. vs. St. Louis S. W. Ry. Co., 249 U. S. 134. But the real effect of the tariffs is to restrict the application of the rates on the intrastate movement to Ada in such a way as to enable the Frisco to control the movement to interstate shipments of cement from Ada, which is unlawful. The commission has frequently condemned attempts of certain carriers to hold traffic on their own lines, and there is no doubt but that the commission has jurisdiction over this phase of the situation.

The commission should find that the provisions of the tariff under suspension and investigation, and of the tariff under suspension and investigation are unlawful because they constitute unreasonable regulations and practices affecting interstate rates on cement from Ada, Okla. An order should be entered requiring cancellation of both tariffs.—*Traffic World.*

Rates on Gypsum Rock

EXAMINER C. I. KEPHART of the Interstate Commerce Commission, in a proposed report in No. 15949, Gulf States Portland Cement Co. vs. Norfolk & Western et al., has recommended a finding that rates on gypsum rock from Plasterco and Saltville, Va., to Spocari, Ala., be found unreasonable and unduly prejudicial and preferential in the past, that the present rate be found not unreasonable but unduly prejudicial and that reparation be awarded.

Complainant alleged that the applicable rates from the points of origin to destination had been and were unreasonable and unduly prejudicial to it and preferential of its competitors at Chattanooga, Tenn., and Leeds and Birmingham, Ala., who ship the same commodity from the same points. The examiner said the Commission should find that the rates assailed were unreasonable to the extent that they exceeded 20.5c prior to July 1, 1922, and 18.5c on and after that date until June 1, 1924, and that the present rate, which is 18.5c, was not and for the future would not be unreasonable. He further recommended that the Commission find that the rates to Spocari and Leeds had been and for the future would be unduly prejudicial to complainant and preferential of its competitor at Leeds to the extent that the rate to Spocari had exceeded or would exceed 1.5c more than the rates contemporaneously in effect to Leeds. The present rate to Leeds is 16c.—*Traffic World.*

Phosphate Rock Rates

THE Commission in No. 15206, Traffic Bureau of Knoxville et al. vs. Atlantic Coast Line et al., mimeographed, has found rates on phosphate rock from Dunnellon, Prairie, Bartow and other points in Florida taking the same rates to Knoxville, Tenn., unreasonable and unduly prejudicial, as compared with rates to the Carolina group, to the extent that they exceeded, exceed or might exceed rates of $5.25 prior to July 1, 1922, and $4.73 on and after that day. It found that the Knoxville Fertilizer Co., one of the complainants, had made shipments and was entitled to reparation.—*Traffic World.*

Lehigh Acquires Old Alsen's Cement Plant

THE sale of the Hudson Valley Portland Cement Corporation plant at Alsen, N. Y., to the Lehigh Portland Cement Co., as noted in the April 18 issue of ROCK PRODUCTS, has been completed. This property was offered for sale at public auction. No bid less than $500,000 was considered. The Lehigh company plans to have the plant in operation as soon as possible after alterations.

Chicago City Council Repudiates Charges Made Against John J. Sloan

JOHN J. SLOAN, president of the National Crushed Stone Association, is also president of the Chicago board of local improvements. It is natural that he should have the enmity of some pretty powerful influences in this position, especially as he has introduced improvements in methods of construction. Several attacks have been made upon him, the latest being a charge that he favored concrete construction because of his interest in the Wisconsin Granite Co. The Chicago city council heard charges against Mr. Sloan which were prepared by Alderman Nelson and voted to dismiss them, only four aldermen voting with Nelson. According to the *Chicago Daily Tribune* of July 23:

"A few minutes earlier Mr. Sloan had issued a statement answering Nelson's charges. It had been charged that Sloan ignored a report compiled by engineers under the direction of F. E. Sullivan, a former newspaper man, which recommends the use of asphalt as an ideal paving material. The report Mr. Sloan characterizes as a '10% report,' and Sullivan, he asserts, is a tool of the asphalt manufacturers.

"'I am not asking Mr. Florence Sullivan or any other asphalt promoter for any engineering or other advice on construction of pavements," declared Mr. Sloan. 'Over a year ago he was given an appropriation of $40,000 for a 10% report, the bulk of which was lifted bodily from the specifications and rules of this department.

Suggests Another Investigation

"'It is the council's privilege to investigate, and I might add that they might investigate how that money was spent and who got it.

"'I never stated I had severed my business connections with the Wisconsin Granite Co. and never had the slightest intention of so doing, and so stated whenever asked, but from the day I accepted public office, I directed my sales manager not only to refrain from quoting on city business but also to refrain from quoting any contractor doing business with the city.

"'Some people would like to see pavements built of materials that would wear out in a year or two and naturally object to a rigid type of lasting pavement of 100 to 300% greater load factor for the same money or less than a plastic asphalt improvement costs.

"'Concrete pavements, when more generally in use, will not require $3,000,000 or more annual expenditure from the wheel tax to keep them in passable condition. Any concrete improvement built during this administration recommends itself.'

Mayor Says Charges Without Foundation

"'I investigated the whole matter a year ago and found the charges against Mr. Sloan absolutely without foundation,' declared Mayor Dever. 'During the course of my inquiry I also found that with the large amount of traffic which streets must bear that concrete or some equally hard material is best for paving.'"

John J. Sloan

Illinois Sand and Gravel Association Starts Advertising Campaign

THE Illinois Sand and Gravel Association has begun an important advertising campaign in the interest of clean aggregates and in connection with its newspaper ads has sent letters to railroad officials, architects, and engineers, of which the following is a sample:

The Illinois Sand and Gravel Association in the interest of good concrete and sound construction has contracted for $5000 advertising space in 26 of the larger downstate newspapers, with a view of educating the public that unprepared sand and gravel hauled from creeks and banks contains dirt and organic matter which prevents the cement from properly performing its function and therefore should not be used.

The enclosed advertising proof carries the first 12 advertisements that are to appear weekly. The first copy was inserted in the Sunday issue of the papers selected on June 14.

You know the danger of using unprepared sand and gravel in construction work of any kind. Being an accepted authority on building materials, you are in a position to materially assist us in this educational campaign and at the same time perform a lasting service for the building public of Illinois. We ask that you join our association and the Portland Cement Association in this important work.

Yours very truly,
T. E. McGrath.

Illinois Gravel Company Expands

ANNOUNCEMENT was made recently by the McGrath Sand and Gravel Co., with headquarters at Lincoln, Ill., of the purchase of an interest in the Flesher Sand and Gravel Co. at Shawneetown, Ill.

The company, which has five plants in central Illinois, is entering a new field. The Shawneetown plant is on the Ohio river and is a dredging operation.

The present capacity of the plant is thirty-five cars daily. The McGrath company plans to double the output in the next thirty days with the installation of new and additional equipment.—*Springfield (Ill.) Journal.*

Union Rock Company Expands

IN a deal involving approximately $1,000,000, according to local papers, the Union Rock Co., Los Angeles, Calif., purchased the Baldwin Park and El Monte plants of the Los Angeles Rock and Gravel Co. The transfer included a four-mile railroad with its rolling stock and a fleet of 40 five-ton trucks. The El Monte plant is the distributing point for the production of the Baldwin Park plant and the private railroad connects them. The Baldwin Park plant has a capacity of 6000 tons daily and is located on a 400-acre deposit.

The selling company will continue to operate its two plants at Culver City and Arroyo Seco and will wholesale exclusively to the Union Rock Co., it is said. The plant at Arroyo Seco was damaged considerably by fire recently and has been the center of much controversy and litigation for some time.

George A. Rogers is president of the Union Rock Co. and Henry W. Hawley is president of the Los Angeles Rock and Gravel Co.

The Union Rock Co. is not only the largest producer of sand and crushed rock on the Pacific Coast but its output is probably larger than that of any company in the United States.

Cement Products

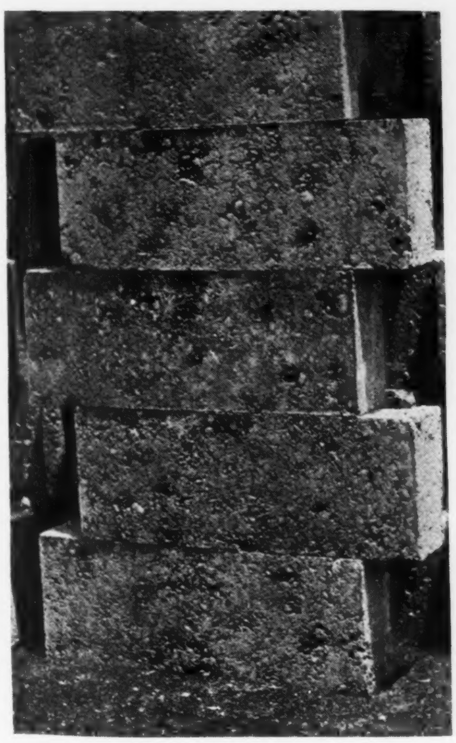
TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Comparisons of Aggregates Used in Concrete Products Manufacture

Showing How the Aggregate Affects the Strength, Weight and Surface Texture of Block and Tile

THERE are two primary requirements for aggregates to be used in the manufacture of concrete building units: (1) The aggregate must produce block, tile or brick of specified strength with economical expenditure of labor and cement and (2) it must produce surfaces of salable and otherwise satisfactory texture.

Fine sands or finely divided stone give smooth surfaces and low strength, while material so coarse as to give irregular edges, broken corners and rough texture invariably produces greater strength. An ideal aggregate is one containing the maximum percentage of coarse aggregate with just enough fines to produce a salable surface. This may be obtained by cautiously adding fines to the very coarse material until surfaces and corners are of satisfactory appearance: when this is done it may be found that the fines cautiously added have increased the strength obtained with the same amount of cement, but if so it will be because they have given better "workability," which means that they have lubricated or "fluxed" the mixture.



The appearance of coarse stone in the face of the block denotes a texture that is both strong and economical

This shows plainly the surface texture of typical cinder blocks which are to be covered with stucco

These brief statements set out the general requirements for satisfactory aggregates for concrete building units so far as gradation is concerned and observations over an extended period have shown that they hold regardless of the nature of the aggregate—whether gravel, broken stone, cinders or, especially, burnt clay. All of these four types of aggregates are now being used in the concrete products industry, the first three of them very extensively. The fourth has already been tried out on a scale sufficient to demonstrate its suitability.

Comparison of Four Aggregates

A comparison of these four aggregates may prove of interest. With similar proportions, gradation and manufacturing process they may be rated roughly in the following order as regards various elements of suitability:

Strength—(1) Gravel or stone; (2) haydite (burnt clay aggregate); (3) bituminous or anthracite cinders.

Smoothness of Surfaces—(1) Stone,

COMPARATIVE WEIGHT OF CONCRETE MASONRY WALLS OF GRAVEL OR STONE, CINDER AND HAYDITE AGGREGATE

I. STANDARD GRAVEL OR STONE AGGREGATE—	Wt. per Unit Lb.	Wt. of 3/8-in. Mortar Joint Lb.	Wt. of Unit and Mortar per Sq. Ft. of Wall Surface Lb.
(a) Hollow block, 33% air space, 8x16 in. face, 12 in. wall thickness	85.5	6	101.8
(b) Hollow block, 33% air space, 8x16 in. face, 8 in. wall thickness	57	4	67.7
(c) Hollow block, 40% air space, 8x16 in. face, 8 in. wall thickness	51.04	3.6	60.8
(d) Solid veneer block, 8x16 in. face, 4 in. wall thickness	42.53	3	50.6
(e) Light weight hollow tile, 50% air space, 5x12 in. face, 8 in. wall thickness	19.94	5.3	53.2
(f) Light weight hollow tile. 50% air space, 5x12 in. face, 4 in. wall thickness	9.97	.3.3	27.2
(g) Solid block, 5x12 in. face, 4 in. wall thickness	19.94	5.3	53.2

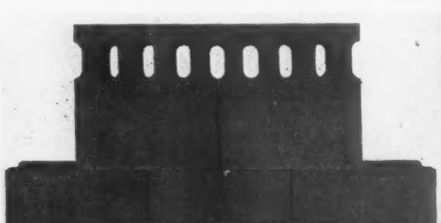
II. CINDER AGGREGATE—	Wt. per Unit Lb.	Wt. of 3/8-in. Mortar Joint Lb.	Wt. of Unit and Mortar per Sq. Ft. of Wall Surface Lb.
(a) Hollow block, 33% air space, 8x16 in. face, 12 in. wall thickness	56	6	68.7
(b) Hollow block, 33% air space, 8x16 in. face, 8 in. wall thickness	37	4	45.4
(c) Hollow block, 40% air space, 8x16 in. face, 8 in. wall thickness	33.1	3.6	40.7
(d) Solid veneer block, 8x16 in. face, 4 in. wall thickness	25.0	3	31.0
(e) Light weight hollow tile, 50% air space, 5x12 in. face, 8 in. wall thickness	12.9	5.3	36.3
(f) Light weight hollow tile, 50% air space, 5x12 in. face, 4 in. wall thickness	6.5	3.3	18.9
(g) Solid block, 5x12 in. face, 4 in. wall thickness	12.9	5.3	36.3

III. HAYDITE AGGREGATE—	Wt. per Unit Lb.	Wt. of 3/8-in. Mortar Joint Lb.	Wt. of Unit and Mortar per Sq. Ft. of Wall Surface Lb.
(a) Hollow block, 33% air space, 8x16 in. face, 12 in. wall thickness	49.5	6	61.4
(b) Hollow block, 33% air space, 8x16 in. face, 8 in. wall thickness	33	4	41.0
(c) Hollow block, 40% air space, 8x16 in. face, 8 in. wall thickness	29.5	3.6	36.7
(d) Solid veneer block, 8x16 in. face, 4 in. wall thickness	25.4	3	31.5
(e) Light weight hollow tile, 50% air space, 4x12 in. face, 8 in. wall thickness	11.6	5.3	32.9
(f) Light weight hollow tile, 50% air space, 5x12 in. face, 4 in. wall thickness	5.8	3.3	17.2
(g) Solid block, 5x12 in. face, 4 in. wall thickness	11.6	5.3	33.2

Slag tiles, the faces of which are corrugated to present the maximum surface for the attachment of stucco

gravel haydite or cinders, depending largely on gradation.

Lightness of Weight—(1) Haydite; (2) cinders; (3) stone or gravel.



This is the surface the public likes, but rough surfaces provide a better bond for stucco

Cutability—(1) Cinders; (2) haydite; (3) stone; (4) gravel.

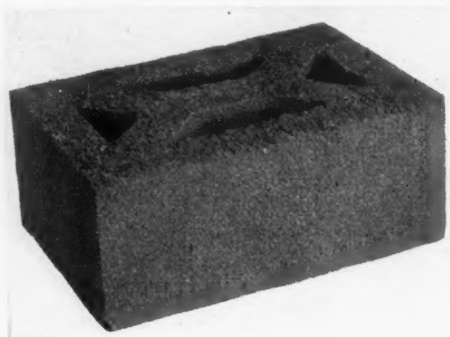
Fire-resistance—(1) Cinders; (2) stone; (3) gravel. (Haydite blocks have not yet been tested.)

Radio of Wall Strength to Unit Strength—Averages 40 to 65% for all.

Nail-ability—(1) Cinders; (2) haydite; (3) limestone; (4) gravel.

Absorption, Greatest First—(1) Haydite; (2) cinders; (3) limestone; (4) gravel.

Cost of Aggregate, Highest First—(1) Haydite. Others vary.

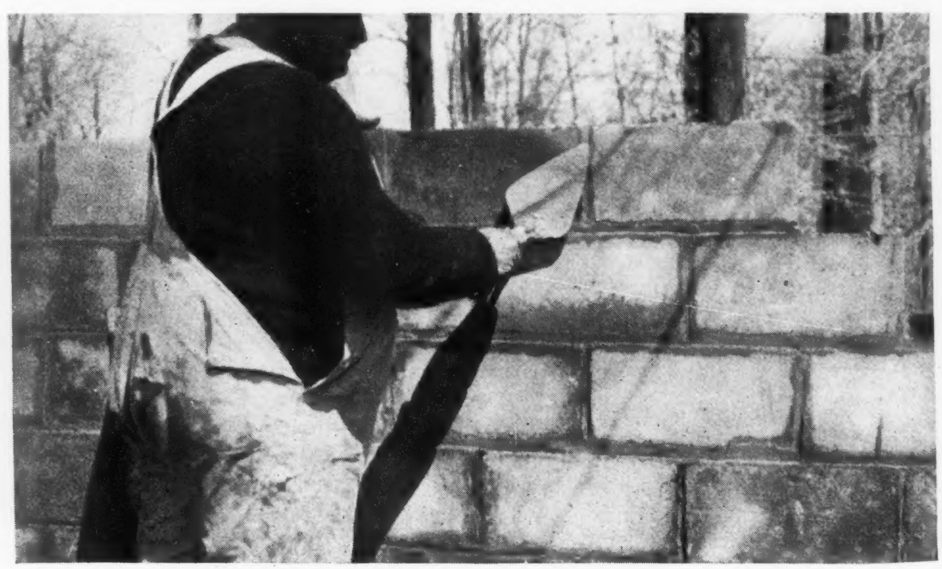


Ideal surface on a tile made with gravel aggregate. Rough top and corrugations aid spreading of mortar

As To State Cement Plants

THE state of Michigan is producing cement and other states have shown indications of doing likewise. The cement manufacturer therefore seems unquestionably to have a vital interest in the matter of day labor. It is conceivable that even the federal and state government themselves may find a self interest in the problem, as the item of taxes flowing in from this second largest industry (public contracting) constitutes a very significant item in their income.

Unquestionably the producing industries, financial interests and possibly public officials should demand a scientific investigation of federal and state day labor which would reveal the true operation of the system. If it is economically sound, it should be adopted. If it is not economically sound, it should be condemned, and every office holder who employs it for his own purpose should be driven from office.—*General Contracting.*



A very salable block, but the texture is too fine, indicating uneconomy of cement and a poor mechanical bond

Concrete Products Work Extraordinary

A DECIDEDLY original piece of concrete work is disclosed in the photographs which show a bit of interior decoration in the home of R. K. Le Blond, in Cincinnati, Ohio. This home is a new residence which is said to have cost $100,000 and the bit shown is in a niche leading from the breakfast room communicating through an archway.

The designer is Louis Kuertz, who is an

As it appears from the breakfast room. The Japanese ornaments at the side are quite in keeping with the landscape

art cement worker in Cincinnati. The source of the idea is evidently the Japanese miniature garden, which by having everything on a reduced scale and by viewing it through an arch or a similar opening, gives an impression of distance and that of looking upon a landscape of considerable extent.

The background is of painted canvas, but aside from this the correspondent who sent in the pictures writes that practically everything is made from cement, including the trees in the middle distance.

Clay molds were first set up and then castings were made of concrete in the ordinary way and joined together to produce the picture. Tinting was used so that everything would appear in its natural color.

In the foreground is a miniature lake of water into which a number of tiny streams trickle from the cement cliffs, thus adding to the animation as well as the beauty of the picture.

Crushed Limestone and Tile Waste Good for Concrete

GOOD concrete can be made from crushed limestone or hollow tile waste, the Bureau of Standards, Department of Commerce, finds. The only drawback to the use of such material is the angularity of the pieces, which makes the concrete flow less readily and makes it harder to handle by the methods used in large construction enterprises. This drawback can be remedied by oversanding, the Bureau believes.

Large quantities of waste material accumulate around quarries producing dressed limestone, and the same is true of plants manufacturing hollow tile. An investigation was undertaken by the Bureau of Standards to see if this material could not be used for concrete. Test cylinders were made up, using several standard proportions, and using as the coarse aggregate limestone in some of the cylinders, crushed tile in others, and Potomac river gravel in others. The other conditions were made as nearly the same as possible. In the tests the limestone concrete proved slightly weaker than the gravel, and the tile concrete about one-fourth stronger.

Effect of End Condition of Concrete Cylinder on Strength Tests

DATA of value to testing engineers and others interested in concrete tests have been published in Bulletin 14 of the Structural Materials Research Laboratory, Lewis Institute, Chicago, "Effect of End Condition of Cylinder on Compressive Strength of Concrete," by Harrison F. Gonnerman. The report is reprinted from the 1924 Proceedings of the American Society for Testing Materials.

The relative effect of the different end conditions was observed and judged principally by the ratio of the strength obtained for a given condition to that obtained for a standard method specified in the "Tentative Methods of Making Compression Tests of Concrete" (Serial Designation C39-21T) of the American Society for Testing Materials. About 3000 6x12-in. concrete cylinders of 1:7, 1:5, 1:3½ and 1:2 mix by volume were tested at ages of seven days to one year.

A bibliography is included.

Cement Sacks and Service

THE Universal Portland Cement Co., Chicago, has recently issued a pamphlet in which is discussed the question of "Who pays for 'free' service?" The article points out the simple economic fact that the user pays for the container as well as the commodity itself whether the sale price indicates it or not. Inasmuch as the public must pay the cost of this container, it is to the interest of the buyer to keep this cost at a minimum. The article points out that in the case of paper cement sacks, as is likewise true of a tomato can, pickle jar, candy box or shaving cream tube, the price paid for the cement, or other commodity, includes the charge for the package. In general, the same is true for the cloth cement sack except that it is more readily and economically usable again. The cement company, of course, employs considerable labor to handle, repair and keep accounts of these returned sacks. However, the careful user is given the benefit of his economy and pays only his share of the ultimate cost. Considering the service it performs and the value of the product, this container costs the user proportionately less perhaps than any other container for any commodity.

The background and sky are painted on canvas. Practically all the rest is made of concrete, even the trees in the middle distance

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	1.25
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	....
Walford, Penn.	1.00	1.30	....	1.50h	1.50h	....
Watertown, N. Y.	.50	....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	....	1.85	....	....	....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.00	....	1.15	.95	1.00	1.00
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.20	1.20	1.20	1.10	1.10	1.10
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.30	1.15	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern New Jersey	1.30	....	1.80	1.60	1.40	....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	....	....	1.10	....
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	....	1.20†	1.10	1.05	....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	....	1.00@1.15	.90@1.05	.90@1.05	....
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	....
Bridgeport and Chico, Texas	1.00	1.35	1.25	1.25	1.20	1.10
Cartersville, Ga.	1.65	1.65	1.65	1.35	1.35	....
El Paso, Texas	1.00	1.00	1.00	1.00	....	....
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	....
Graystone, Ala.	Crusher run fluxing stone, 1.00 per net ton					
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	....	....	....	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.10	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	....	1.25	1.25	1.10	....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.50	1.35	1.35	1.35	1.25	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	2.00	1.80	1.40	1.40	....
Oakland and El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	....
Springfield, N. J.	1.70	2.00	2.00	1.70	1.60	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite	1.50 all sizes					
Columbia, S. C.—Granite	.50	1.75	1.75	....	1.60	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.—Granite	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	....
Richmond, Calif. (Basalt)	.75*	....	1.50*	1.50*	1.50*	....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼-in. (g) 2-in. (h) less 10c discount.

Agricultural Limestone
(Pulverized)

Alton, Ill. — Analysis, 97% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	4.00
Pulverized	1.85
Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 90% thru 50 mesh	1.50
Cartersville, Ga. — Analysis, 68% $CaCO_3$; 32% $MgCO_3$; 50% thru 100 mesh	1.50
Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas—Pulverized	2.50
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn. — Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va. — Analysis, 90% $CaCO_3$, guaranteed; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb hemp bags	5.00
Olive Hill, Ky. — Analysis, 90% or more $CaCO_3$; pulverized, bags, 4.00; bulk	2.00
Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va. — Analysis, 95% $CaCO_3$; 50% thru 200 mesh	1.75@2.00
Asphalt filler dust, 80% thru 200 mesh	3.00@3.50
Waukesha, Wis.—90% thru 100 mesh	4.00
Watertown, N. Y.—Analysis 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Pulverized; paper bags, 4.10; cloth, 4.60; bulk	2.85

Agricultural Limestone
(Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Bedford, Ind. — Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo. — Analysis, 99% $CaCo_3$; 100% thru 4 mesh	.60
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh		.80
Chico, Texas—50% thru 50 mesh, 50% thru 4 mesh		1.00
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh		1.20
Cypress, Ill.—90% thru 100 mesh		1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh		1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Garrett, Okla.—All sizes		1.25
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh		.60
Kansas City, Mo.—50% thru 100 mesh		1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh		2.00
Screenings (¼ in. to dust)		1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk		1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@	2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh		1.60
Milltown, Ind.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh	1.45@	1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh		1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh		1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@	1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh		.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk		2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk		3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@	3.50
Rocky Point, Va.—80% thru 200 mesh	3.00@	3.50
Waukesha, Wis.—97% thru 100 mesh, bulk		4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:		
Berkeley Springs, W. Va.		2.25
Cedarville and S. Vineland, N. J.—Damp		1.75
Dry		2.25
Cheshire, Mass:		
6.00 to 7.00 per ton; bbl.		2.50
Columbus, Ohio		1.25
Estill Springs and Sewanee, Tenn.		1.50
Franklin, Penn.		2.00
Gray Summit and Klondike, Mo.	1.75@	2.00
Los Angeles, Calif.—Washed		5.00
Mapleton Depot, Penn.	2.00@	2.25
Massillon, Ohio		3.00
Mineral Ridge and Ohlton, Ohio		2.50
Oceanside, Calif.		3.00
Ottawa, Ill.—Chemical and mesh guaranteed		1.50
Pittsburgh, Penn.—Dry		4.00
Damp		3.00
Red Wing, Minn.:		
Bank run		1.50
Ridgway, Penn.		2.00
Rockwood, Mich.	2.75@	3.25
Round Top, Md.		2.25
San Francisco, Calif.	4.00@	5.00
St. Louis, Mo.		2.00
Sewanee, Tenn.		1.50
Thayers, Penn.		2.50
Utica, Ill.	1.00@	1.15
Zanesville, Ohio		2.50
Miscellaneous Sands:		
Aetna, Ind.:		
Core, Box cars, net, .35; open-top cars		.30
Albany, N. Y.:		
Molding coarse		2.00
Molding fine, brass molding		2.25
Sand blast		3.75
Arenzville and Tamalco, Ill.:		
Molding fine and coarse	1.40@	1.60
Brass molding		1.75
Beach City, Ohio:		
Core		1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buaffl0, N. Y.	1.10	.95			.85	
Erie, Penn.		1.25		1.50	1.75	
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	
Hartford, Conn.	.65*					
Machias Jct., N. Y.		.75	.75	.75	.75	.75
Montoursville, Penn.		1.10	1.10	1.00	.90	.90
Northern New Jersey		.50	1.00@1.50	1.00@1.25	1.00@1.25	
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85				1.10@1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.		.60	.80	.80	.80	.80
Chicago, Ill.	1.35‡	1.75‡	1.75‡	1.75‡	1.75‡	1.75‡
Columbus, Ohio	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80			.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.		.50		.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.		.40			1.25	
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.*	.35	.35	1.35	1.25	1.25	1.25
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50		1.25	1.25	
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.55	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.90	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.55	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .60			
Zanesville, Ohio	.70	.60	.60	.60	.90	
SOUTHERN:						
Charleston, W. Va.	1.35			1.47	1.47	1.47
Chehaw, Ala.	00@ .30		.40	.50		
Knoxville, Tenn.	1.00	1.20		1.20	1.20	1.20
Macon and Gaillard, Ga.		.50		.65	.65	.65
New Martinsville, W. Va.	1.00	.80@1.00	1.30			.80@ .90
Roseland, La.	.45	.40	1.75	1.25	1.00	1.00
Smithville, Texas		.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	
Kansas City, Mo.	.80	.70				
Los Angeles, Calif.	.50	.50	.92	.92	.92	
Los Angeles District (bunkers)†	.80	1.30	1.30	1.30	1.30	1.30
Pueblo, Colo.	1.10*	.90*		1.60*		1.50*
San Diego, Calif.		.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Chehaw, Ala.	00@ .30					
Des Moines, Iowa		Washed, .65; unwashed, .40 (not screened)				
Dudley, Ky. (crushed silica)	1.10	1.10	.90	.90		
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.		Mixed gravel for concrete work, .65				
Lindsay, Texas		1.10				.55
Macon, Ga.		.35				
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00				
Zanesville, Ohio						.55

*Cubic yd. †Include freight and bunkerage charges. ‡Delivered on job. (a) ¾ in. down. (b) River run. (c) 2½-in. and less.

Miscellaneous Sands

(Continued from preceding page)

Furnace lining ... 2.50
Molding fine and coarse ... 2.00
Traction unwashed and screened ... 1.75

Cheshire, Mass.—Furnace lining, molding fine and coarse ... 5.00
Sand blast ... 5.00@ 8.00
Stone sawing ... 6.00

Columbus, Ohio:
Core ... .30@ 1.50
Traction ... .30@ .90
Molding coarse ... 1.25@ 1.75
Furnace lining ... 1.75@ 2.50
Stone sawing ... 1.25@ 1.50
Brass molding ... 2.00@ 2.50
Sand blast ... 3.50@ 4.00
Molding fine ... 2.00@ 2.25

Eau Claire, Wis.:
Sand blast ... 3.00@ 3.25

Elco, Ill.:
Ground silica per ton in carloads ... 22.00@31.00

Elnora, N. Y.:
Brass molding ... 1.75@ 2.00

Estill Springs and Sewanee, Tenn:
Molding fine and core ... 1.25
Roofing sand, sand blast, traction ... 1.35@ 1.50

Franklin, Penn.:
Core, furnace lining, molding fine and coarse ... 1.75

Gray Summit and Klondike, Mo.:
Stone sawing ... 1.00
Core, furnace lining, molding fine, roofing sand ... 1.75
Brass molding ... 1.75@ 2.00
Sand blast ... 2.00

Joliet, Ill.:
No. 2 molding sand; also loam for luting purposes and open-hearth work ... .65@ .85

Kasota, Minn.:
Stone sawing ... 1.00

Mapleton Depot, Penn.:
Molding fine and coarse, traction ... 2.00

Massillon, Ohio:
Core, furnace lining, molding fine and coarse ... 2.50
Traction ... 2.00

Michigan City, Ind.:
Core, in open car, .30; in box car ... .35
Traction ... .25

Mineral Ridge and Ohlton, Ohio:
Furnace lining, molding coarse, sand blast, traction (damp) ... 1.75
Roofing sand (damp) ... 1.75@ 2.00
Core, molding fine (damp) ... 2.00

Montoursville, Penn.:
Traction ... 1.10
Core ... 1.25@ 1.50

New Lexington, Ohio:
Molding fine ... 2.00
Molding coarse ... 1.50

Oceanside, Calif.:
Roofing sand ... 3.50

Ottawa, Ill.:
Core, furnace lining, molding coarse, roofing sand, traction, brass molding ... 1.25
Molding fine ... 2.50
Stone sawing ... 3.00
Sand blast ... 4.00
Molding coarse (crude silica, not washed or dried) ... .75@ 1.00

Red Wing, Minn.:
Core, furnace lining, stone sawing ... 1.50
Molding fine and coarse, traction ... 1.25
Sand blast ... 3.50
Filter sand ... 3.75

Ridgway, Penn.:
Molding fine and coarse ... 1.25@ 1.50
Furnace lining (loam sand) ... 1.50
Core ... 1.75@ 2.00

Round Top, Md.:
Core ... 1.60
Traction ... 1.75
Roofing sand ... 2.25

St. Louis, Mo.:
Core ... 1.00@ 1.75
Furnace lining ... 1.50
Molding fine ... 1.50@ 2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35@2.50	1.35@1.70	1.45@1.80	1.35@1.70	1.35@1.70	1.35@1.70	1.35@1.70
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Dubois, Penn.	2.35@2.50	1.35@1.70	1.45@1.80	1.35@1.70	1.35@1.70	1.35@1.70	1.35@1.70
Reading, Pa.	2.50	1.00	....	1.25	....	....	....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	1.75	1.45	....	1.45	1.45
Jackson, Ohio	....	1.05	....	1.30	1.05	1.30	1.30
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	....	1.55	....	1.55	1.55	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	....	....	12.00	....	....	....	....	2.20
Buffalo, N. Y.	....	12.00	12.00	12.00	....	....	....	....
Lime Ridge, Penn.	....	....	....	....	....	....	5.00a	....
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00	....	....	....	....	2.25t
Williamsport, Penn.	....	....	10.00	....	....	....	6.00	....
York, Penn.	....	10.50	10.50	11.50	....	....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	....	10.00	....	....	....	....	9.00	....
Delaware, Ohio	12.50	10.00	9.00	10.50	10.00	15.00	9.00	1.50
Gibsonburg, Ohio (f)	12.50	....	9.00	....	9.00	11.00	....	....
Huntington, Ind.	12.50@14.50	10.00	9.00	....	....	....	9.00	....
Luckey, Ohio (f)	12.50	....	....	....	....	....	....	
Marblehead, Ohio	....	10.00	9.00	10.00v	....	....	9.00	1.50c
Marion, Ohio	....	10.00	9.00	....	....	....	9.00	1.50c
Sheboygan, Wis.	....	....	....	....	....	....	9.50	....
Tiffin, Ohio	....	....	....	....	9.00	....	....	....
White Rock, Ohio	12.50	....	....	....	9.00	11.00	9.00	....
Woodville, Ohio (f)	12.50	10.00	9.00	....	9.00	10.50l	9.00	1.50
SOUTHERN:								
El Paso, Texas	....	....	....	....	....	....	10.00	1.75
Graystone, Wilmay and Landmark, Ala.	12.50	11.00	....	11.00	....	10.00	8.50	....
Karo, Va.	....	10.00	9.00	....	....	....	7.00g	1.65h
Knoxville, Tenn.	20.50	11.00	....	....	....	1.35	8.00	1.50
Ocala and Zuber, Fla.	13.00	12.00	10.00	....	....	1.50	12.00	1.70
Varnons, Ala. (f)	....	10.00p	10.00p	....	....	....	8.00q	1.40r
WESTERN:								
Kirtland, N. M.	....	....	....	....		....	15.00	....
San Francisco, Calif.	20.00o	20.00o	15.00	20.00o	....	....	14.50o	2.40o

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. bbl.; 2.65, 280-lb. bbl.; (l) 80-lb. paper; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering, 3.00 finishing; (u) two 90-lb. bags; (v) bulk.

Miscellaneous Sands

(Continued)

Molding coarse ... 1.25@ 1.75
Roofing sand ... 1.75
Sand blast ... 3.50@ 4.50
Stone sawing ... 1.25@ 2.25
Traction ... 1.25
Brass molding ... 2.00@ 3.00

San Francisco, Calif:
(Washed and dried) — Core, sand blast and brass molding ... 3.50@ 5.00
Furnace lining and roofing sand ... 3 50@ 4.50
Molding fine and traction ... 3.50
Molding coarse ... 4.50
(Direct from pit)—Core and molding fine ... 2.50@ 4.50

Sewanee, Tenn.:
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding ... 1.25

Skerkston, Ont.:
Traction (lake sand) ... .65

Tamms, Ill.:
Ground silica per ton in carloads ... 20.00@31.00

Thayers, Penn.:
Core ... 2.00
Molding fine and coarse ... 1.25
Traction ... 2.25

Utica, Ill.:
Core, furnace lining, brass molding (crude) ... .60@ 1.15
Molding fine and coarse (crude) ... .55@ 1.15
Traction ... 1.00
Roofing sand ... 1.00@ 2.75
Stone sawing ... 1.00@ 2.85
Sand blast ... 2.85@ 3.50
Molding fine ... .60
Molding coarse ... .65@ .70
Core and furnace lining ... .75

Utica, Penn.:
Core ... 2.00
Molding fine and coarse ... 1.75

Warwick, Ohio.:
Core, molding fine and coarse (green) ... 1.75
Core, molding fine (dry) ... 2.25

Zanesville, Ohio:
Core and molding coarse ... 1.50@ 1.75
Molding fine, brass molding ... 1.75
Traction ... 2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Baltimore, Md.:
Crude talc (mine run) ... 3.00@ 4.00
Ground talc (20-50 mesh), bags ... 10.00
Cubes ... 55.00
Blanks (per lb.) ... .08
Pencils and steel workers' crayons, per gross ... 1.25

Chatsworth, Ga.:
Ground (20-50 mesh), bags ... 10.00
Ground (150-200 mesh), bags ... 12.00
Pencils and steel workers' crayons, per gross ... 1.50

Chester, Vt.:
Ground (150-200 mesh), bags ... 9.00@15.00
Bags ... 10.00@11.00

Chicago and Joliet, Ill.:
Ground (150-200 mesh), bags ... 30.00

Emeryville, N. Y.:
(Double air floated) including bags;
325 mesh ... 14.75
200 mesh ... 13.75

Hailesboro, N. Y.:
Ground white talc (double and triple air floated) including bags, 350 mesh ... 15.50@20.00

Henry, Va.:
Crude (mine run) ... 3.50@ 4.00
Ground (150-200 mesh), bags ... 9.00@15.00

Keeler, Calif.:
Ground (200-300 mesh), bags ... 20.00@30.00

Natural Bridge, N. Y.:
Ground talc (300-325 mesh), bags ... 13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-70% ... 4.00@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 72% ... 5.50@6.00
B.P.L. 75% ... 6.00
B.P.L. 75% (free of fines for furnace use) ... 6.50@ 6.75
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L. ... 5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb. 7.00@ 8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.8ʃ	10.50	8.40	8.75
20x12	12.60	10.50	8.40	8.75
20x10, 18x10, 18x9, 18x12	12.60	10.50	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.70	8.75
14x10	11.10	11.00	8.40	8.75
14x8	11.10	11.00	8.10	7.80
14x7 to 12x6	11.10	10.50	8.10	7.80
	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 65%	7.00
13% phosphorus, 95% thru 80 mesh	5.75
Twomey, Tenn.—B.P.L., 65%	7.00@ 8.00

Florida Phosphate
(Raw Land Pebble)
Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00@16.50
No. 2 lump, per net ton	17.00@17.50
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	18.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt. — English pink and English cream	*11.00	*11.00
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y. — Mica Spar		8.00@10.00
Easton, Penn., and Phillipsburg, N. J.—Green granite	12.00@16.00	12.00@16.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio (in bags)		12.00@20.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt. — Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50

Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — "Natrock" roofing grits		†12.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.
*C.L. including bags; L.C.L. 12.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	25.00@45.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	18.00@21.00	35.00@37.50
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.50@15.00
Syracuse, N. Y.	*18.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla. — White	13.00
Buff	17.00

*Mill price, 20.00 delivered.

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	13.50@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	——
Denver, Colo.	24.00	
Detroit, Mich.	12.40	12.40
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	......	18.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	......	21.00
New Orleans, La.	24.00	16.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16 00
St. Louis, Mo.	23.00	19.00
San Francisco, Calif.	......	22.00
Seattle, Wash. (paper sacks)	24.00	——

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Boston, Mass.	......	2.63
Buffalo, N. Y.	......	2.48
Cedar Rapids, Iowa	......	2.44
Cincinnati, Ohio	......	2.47
Cleveland, Ohio	......	2.39
Chicago, Ill.	......	2.20
Columbus, Ohio	......	2.44
Dallas, Texas	.48¾	1.95
Davenport, Iowa	......	2.39
Dayton, Ohio	......	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	......	2.25
Duluth, Minn.	......	2.19
Indianapolis, Ind.	......	2.39
Kansas City, Mo.	54¼	2.17
Los Angeles, Calif.	.63	2.52
Louisville, Ky.	......	2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.	......	2.25
Minneapolis, Minn.	......	2.41
Montreal, Que.	......	1.90
New York, N. Y.	......	2.25
Omaha, Neb.	.62¾	2.51
Philadelphia, Penn.	......	2.41
Pittsburgh, Penn.	......	2.19
San Francisco, Calif.	......	2.71*
St. Louis, Mo.	.57¼	2.30
St. Paul, Minn.	......	2.41
Seattle, Wash.	......	2.65
Toledo, Ohio	......	2.40

NOTE—Add 40c per bbl. for bags.
Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	......	1.95
Concrete, Wash.	......	2.35
Davenport, Calif.	......	2.05
Hannibal, Mo.	......	2.05
Hudson, N. Y.	......	2.05
Leeds, Ala.	......	1.95
Mildred, Kan.	......	1.95
Nazareth, Penn.	......	1.95
Northampton, Penn.	......	1.95

*Including sacks at 10c each.

Cement Products

Hawthorne tile, carload lots, f.o.b. Cicero, Ill.

	Per sq.
Red French	9.50
Green French	11.50
Red Spanish	12.00
Green Spanish	12.00

	—Cicero— Red	Green
Ridges	.25	.35
Hips	.20	.30
Ridge closers	.05	.06
Hip terminals, 3 way	1.25	1.50
Hip starters	.50	.60
Gable finials	1.25	1.50
Gable starters	.20	.30
End bands	.20	.30
Eave closers	.06	.08

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	8.00	15.00	7.00	9.00	9.00	9.00	......	25.80	11.00	......	......	......
Douglas, Ariz.	......	......	7.00	......	16.5¶	......	19.50	......	......	15.50	......	......	......
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	......	26.55	20.00	......	......	......
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	18.00	7.00	27.15	17.00	......	20.00	30.00
Hanover, Mont.	......	......	......	11.80	......	......	......	......	......	......	......	......	......
Los Angeles, Calif.	......	......	......	10.90b	......	......	12.30	......	......	......	......	......	......
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	......	20.00	30.00
Portland, Colo.	......	......	......	10.00	......	......	......	......	......	......	......	......	......
San Francisco, Calif.	......	......	......	......	16.40	......	17.40	......	......	......	......	......	......
Sigurd, Utah	......	......	......	......	......	......	......	......	18.00a	......	......	......	......
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	......	......	......	......	28.50	......	34.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) sacks, 12c each.

New Machinery and Equipment

New Developments in Plaster Wall Board Drying

By H. R. Masters, Mgr. Chicago Office, Coe Manufacturing Co.

THERE has been an unusual expansion during the past year in the manufacture of plaster wall board, and a corresponding improvement in the methods of drying. Most of the larger manufacturers are now using the continuous roller dryer, which threatens to entirely replace the old style tunnel kilns.

The roller dryer was first used for drying thin lumber and veneers, and an interesting story is told of the difficulties of getting it introduced in this industry. When the idea was first explained to an engineer of one of the larger gypsum companies, he said it looked fine, but that the dryer would have to be nearly a mile long and cost about a million dollars as it required low temperatures and 12 hours time to dry gypsum board. Today these same boards are dried flat, in a horizontal position, continuously as they come from the board belt in about one hour's time. A single dryer 250 ft. long will handle capacities of 200,000 sq. ft. daily which was unheard of in the old style plants. There is also absolutely no comparison in the quality and appearance of product obtained.

All of this was not accomplished without considerable effort, delay and expense. The first installation cost nearly $100,000 for a capacity of 150,000 sq. ft. daily, and after two years operation the dryer was almost completely torn down and rebuilt. A new type of air circulation system had to be developed for this particular product, but all of these problems were solved. The continuous dryer for plaster wall board is now practically a standardized proposition.

The Coe Manufacturing Co. of Painesville, Ohio, who are the originators and inventors of the roller dryer are now completing three large installations as follows: Universal Gypsum Co., Rotan, Texas; Universal Gypsum Co., Akron, N. Y.; Texas Cement Plaster Co., Hamlin, Texas.

A large dryer will also be installed a little later in a new plant of the Ontario Gypsum Co. at Montreal, Canada. As a result of past experience, tests and experimental work, the following improvements have been incorporated on these new dryers.

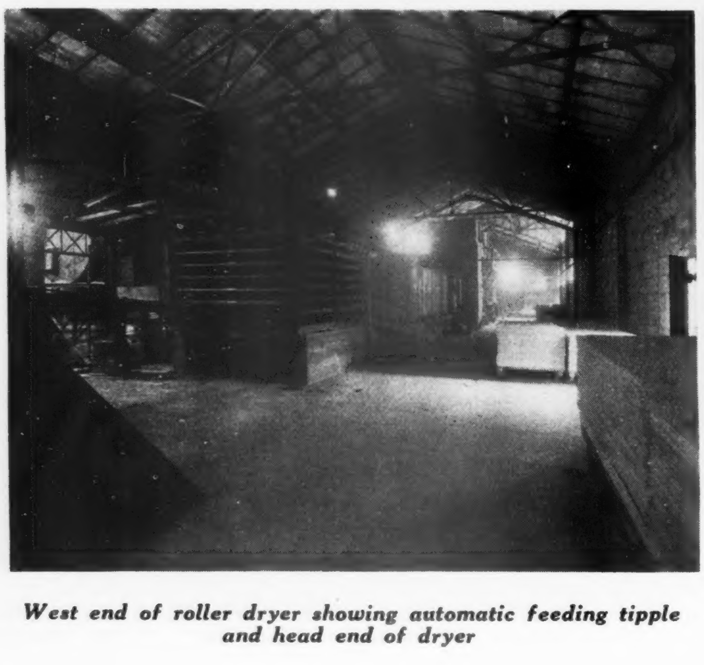
The air system is developed with absolute control of recirculation and humidity, which is a safe-guard against "peelers," burned boards, etc. A patented cross nozzle system of air supply gives a positive and even distribution of air between the decks. The return air duct is built of concrete as a part of the foundation under the dryer, and is provided with a damper control to prevent leakage of hot air from the ends of the dryer. The board belt may therefore be placed right over the dryer if desired. About 85% of the air is recirculated, mixed with fresh air, reheated and used over again with resulting economy of steam and power.

The steam circulating system has been completely redesigned so that 3 traps and tanks replace about 50 traps formerly used. The steam is circulated in stages at high velocities, the condensate going to the large tanks, and the hot water is then put through several condenser sections and returned directly to the boiler at high temperatures. On the latest dryers, only 2 lb. of steam is required to evaporate a pound of water, whereas on the older types and tunnel kilns, at least 3½ lb. of steam is required per pound of water evaporated.

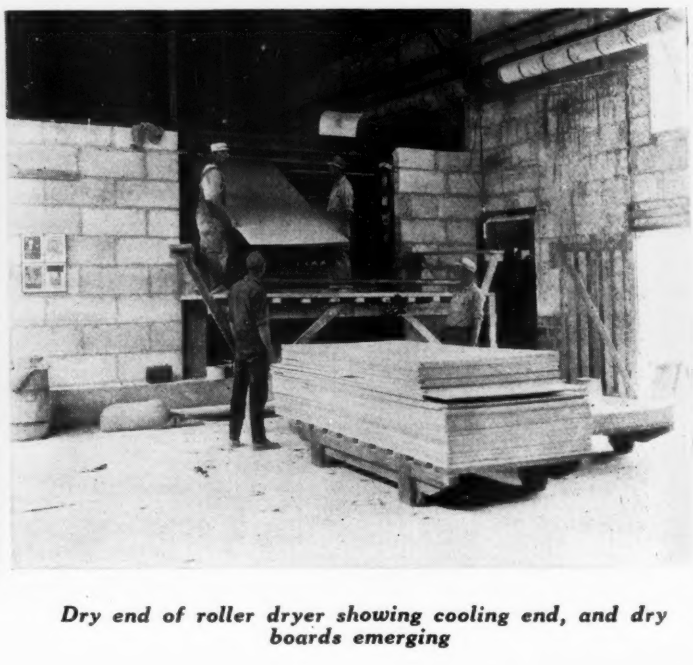
The dryers are now much more effectively insulated, so very little heat is radiated to the room, and operators can work in comfort. A steel frame door with insulation 2 in. thick and an improved tight latch construction has replaced the old wood frame door with 1 in. of insulation.

A new combination ball-bearing and hanger for the roller shafts has been designed and thoroughly tested for over a year. This new bearing runs with so little friction that a 5 h.p. motor will run a large 6-deck dryer. Up to date no lubrication has been required even for high temperatures.

The cooling end at the dry end of the dryer has been extended in length to give a longer time for the boards to cool down to room temperature before piling on trucks. This prevents sweating and has an important bearing on quality. With modern equipment and methods, the percentage of culls and seconds is almost negligible. To the operator using tunnel



West end of roller dryer showing automatic feeding tipple and head end of dryer



Dry end of roller dryer showing cooling end, and dry boards emerging

kilns where this percentage of waste and seconds ranges from 10 to 30% or higher, the large saving in this respect is indeed a revelation.

Finally the engineers of the Coe Mfg. Co. have designed and produced their own automatic power belt driven transfer and feeding tipple. All handling of wet boards is eliminated with resulting improvement in quality and appearance. One operator works both devices, which feeds the boards continuously from the board belt into the dryer, six high by two wide. The belt may be placed either over or along one side of the dryer, as best suits the individual plant layout.

Progress in the drying art has been rapid. Four years ago, the Coe Mfg. Co. built their first experimental board dryer, and today it is obsolete. It was replaced recently at a cost of over $10,000 by a new model of larger size embodying all the latest ideas. This dryer is installed in connection with a rather complete laboratory at the Coe plant, and is available at any time for drying samples of board of any size up to 6 ft. wide. Accurate observations may be made as to drying time and quality under various conditions of temperature, humidity, arrangement of rollers and other conditions.

The continuous roller dryer principle has also proven practical for other types of boards, and flat products made from wood fibres, corn stalks, bagasse, etc. Dryers are in use by such concerns as the Celotex Co., the Insulite Co., Beaver Products, Thames Paper Co., etc. A number of difficult problems were successfully solved by the old experimental dryer, and it is hoped the new dryer and laboratory facilities will prove equally beneficial to the board industry in general.

A Machine for Handling Cement from Storage Plants

THE difficulties and the dangers of handling cement from storage are well enough understood. To quote from the catalog of F. L. Smidth and Co. on handling cement from storage:

"Finished cement as it reaches the stock house partakes more of the characteristic of a heavy fluid than it does of a dry product. In such a state its angle of repose is very flat. Changes while in the storage cause the cement to assume a condition of coherence which causes the angle of repose to become very steep, even vertical. In such a condition force is often required to break the bulk. On the other hand, the mass may fall without warning. What is known as 'arching' is a condition existing in probably every type of stock house. The dangers are obvious and ever present. So far, no methods of prevention or of control have been generally adopted. Improvements are therefore limited to reducing the dangers as far as possible."

Conveyors operated in the ordinary manner are subject to a rush of cement that may hide an uncovered conveyor from sight. Conveyor covers may be left off and workmen will use the conveyor cover for a walkway.

It is evident that what is needed to obviate the dangers and inconveniences spoken of above is a machine which will control the outflow of cement from the silos to the conveyor operating in the tunnel beneath. Such a machine has been developed and placed on the market by F. L. Smidth and Co. (50 Church street New York). It is called the Exbiner. It is shown in the smaller of the two pictures accompanying with the dust covers removed. To quote from the makers' description

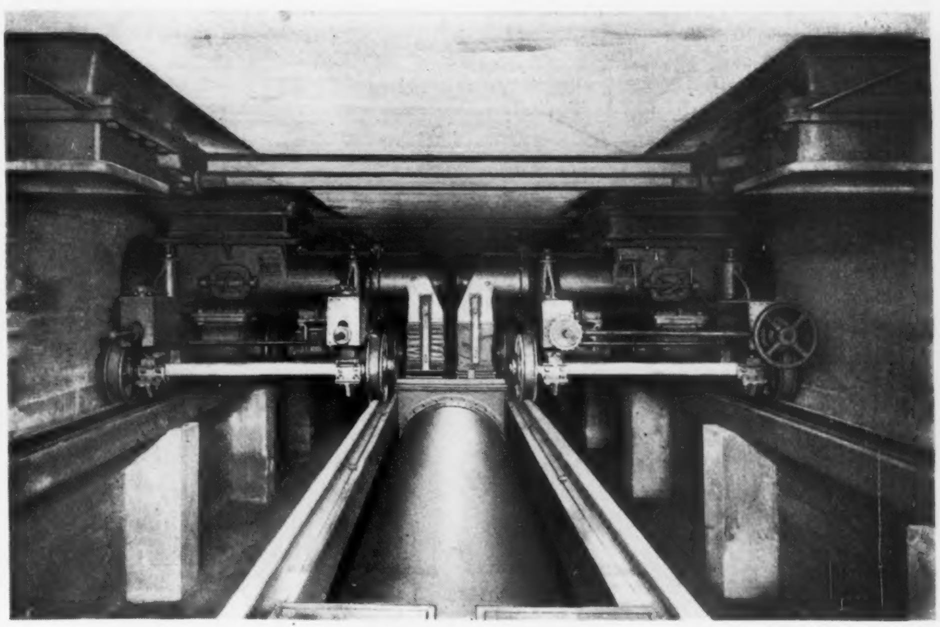
The machine shown with covers removed

"The two hand-wheels connected with the sprocket chain operate, through screws, the toggles which lift the conveyor body to an exact and tight fit with the face of the discharge casting, regardless of whether that casting is level or not. A 5-hp. motor is mounted under the conveyor casing and is direct connected to the gear box. The coupling between the motor and the gear box is provided with a smooth turned hand-winch, which is used for starting the screw in case the motor refuses to start when the current is turned on. The rail wheels are of the double flanged type and are fitted with special roller bearings requiring no oiling. The Exbiner has been designed for a capacity of 450 bbl. of cement per hour continuous operation."

The second and larger picture shows two of a battery of four Exbiners located in the tunnel under the silos at the plant of the Olympic Portland Cement Co. Ltd., Bellingham, Wash., and the manufacturers describe the installation as follows:

"Between the two rails in the center is the concrete conveyor trough. In this case the center of the 16-in. conveyor is 1 ft. above the level of the tunnel floor, which floor is 9 ft. below the floor of the silos. The concrete sides rise 2 ft. 2 in. above the tunnel floor and support a 16-in. conveyor-trough inverted to cover the screw conveyor. Cast iron covers are fitted to the conveyor cover at points opposite to each one of the discharge openings in the bottom of the silos. There is a clear width of 4 ft. between an inner rail and an outer rail. Each discharge-outlet casting is set into the bottom of the silos and is provided with a gate operated by a double rack and pinion by means of ratchets."

"One man can easily roll the Exbiner to the proper location, and by means of the hand-wheels, adjust the Exbiner to the chosen discharge opening in the silo. When the Exbiner is in proper position, the motor is started up to speed and the gate is gradually opened by means of the ratchet. A screw of high resistance is used to check a rush of cement. It is easy to make tight the joint between the Exbiner discharge spout and the opening in the conveyor cover."



Two of a battery of four of these machines which are in use at the plant of the Coe Manufacturing Co.

Concrete in the Santa Barbara Earthquake

[Increasing losses due to earthquakes and tornadoes are causing builders to seek forms of construction which will resist the unusual stresses which come from these. Even in localities where severe earthquakes have never been known, earthquake insurance is being written and designers of structures are keeping earthquakes and tornadoes in mind. The results of the Tokio and Santa Barbara earthquakes are being closely studied and already engineers seem willing to say that steel and concrete and reinforced concrete structures properly designed, and especially if properly constructed, are practically earthquake proof. The following letter to Rock Products gives the observations and opinions of one who was on the ground. He notes particularly that failure in all forms of construction was due to *poor mortar*—not only the mortar used for bonding brick and stone, but that which was the basis of reinforced concrete.—The Editors.]

THE press generally in southern California takes the attitude that poor construction was the cause of failures of large buildings in Santa Barbara.

Where brick walls were properly constructed it was found that they stood the shock practically without damage; for example, the Post Office building and the Y. M. C. A., which withstood the shock well and suffered no damage that could not easily be repaired. These buildings, however, are only *two stories* in height.

Generally the brick were of good quality, and where brick construction had failed, it was due largely to the poor quality of the mortar, *the workmanship*, and the lack of proper anchorage. Where anchors had been used in walls that failed, they pulled out, due to the lack of strength of the mortar.

It is the opinion of some engineers that a 4-in. brick wall has no place in good construction even for partitions or screen walls, and certainly not as a supporting wall, and that the thickness of a wall should be determined by its height and length. Good brickwork was the exception and not the rule in Santa Barbara.

Reinforced Concrete

Reinforced concrete was found to be a first-class building material where properly handled.

Two outstanding failures of reinforced concrete buildings resulted, namely, the old portion of the San Marcos Building and the Arlington Hotel, both of which were of obsolete engineering design. In each of these buildings were pipe sleeve column connections.

Improperly proportioned concrete played a very important part in the failure of portions of these buildings. There was apparently also a lack of uniformity in the mixture of the concrete. In spite of this, remaining portions of both buildings are in fairly good condition.

Where reinforced concrete buildings were designed and constructed according to modern engineering practice, the damage to the structure was slight if any existed. Notable instances of this are the St. Vincent's Orphanage, Santa Barbara High School, the reinforced concrete construction of the theater portion of the Granada building, the Daily News building, and the Cottage hospital.

In the Carrillo hotel and the Central building, which on superficial examination appeared to be considerably damaged, a closer examination showed the structural frame to have suffered very slightly. In the Carrillo hotel not even the plaster was cracked above the second floor.

One thing that stood out above all others was that good construction of every type passed through the ordeal with nominal damage. There was a lamentable amount of construction where the fundamental principles of good building were not observed.

The use of poor mortar is said to have been responsible for more damage than all other causes combined, including both the mortar used in tile and brick work and the mortar that was the basis of the concrete.

Two Virginia Gravel Companies in Injunction Suit

THE Supreme Court of Appeals recently allowed an appeal to the Southern Sand and Gravel Co., Inc., Richmond, Va., which complains of a decree of the Circuit Court of the city of Richmond, dissolving an injunction which appellant had obtained against the Massaponax Sand and Gravel Corporation and the Massaponax Railroad Co., Fredericksburg, Va.

The existing situation, according to the petitioner, gives its legal opponent virtually a monopoly in the sale of gravel in the area between Washington and Richmond, in which many highway contracts are being performed.

In obtaining the preliminary injunction petitioner set out that it and the defendant companies were all engaged in the business of mining, washing and selling gravel from the great Massaponax pit, located in Spotsylvania county, about five miles south of Fredericksburg. After considerable litigation all differences were supposed to have been settled by the making of a contract between the parties to the suit.

But later a controversy arose over a "standard crossing" of petitioner, which is located on part of the property in question, and without which petitioner says it cannot operate. Petitioner alleged that the defendant companies tore out this crossing and that the injunction was sought to prevent their doing so again. The trial court dissolved the preliminary injuction on the ground that it was without jurisdiction to try the case.—*Richmond (Va.) Leader.*

In this reinforced concrete hotel the plaster was not even cracked above the second floor

This reinforced concrete structure failed because of obsolete design and wrongly proportioned concrete

Leasehold Is Held a Depletable Asset

Supreme Court Decides That Lessee, Under Certain Conditions, Has Hight to Claim Depletion Allowance

OVERTURNING the repeated rulings of the Bureau of Internal Revenue that the owner of a leasehold was in no case entitled to depletion deductions in his income tax return, the U. S. Supreme Court, in the case of Lynch v. Alworth-Stephens Co., decided March 2, 1925, has held that a lessee, under certain circumstances, has the privilege of claiming a depletion allowance.

The decision reached in this case should be of considerable interest to sand and gravel producers who are operating properties under leaseholds which were in force before March 1, 1913.

In order to gain an accurate understanding of this new trend of income tax procedure, it is well to recall that under the income tax law of 1917, it was usually held by the Bureau of Internal Revenue that lessees, having no ownership in the mineral, had no property subject to depletion, but were limited to depreciation deductions on equipment and other ordinary and necessary expenses. Therefore, the claim of any lessee for depletion allowances was summarily rejected.

The present Supreme Court decision holds that a lessee has a property right in the mine or deposit and that he is entitled to the return of the value of such property ratably out of income. The logical basis for calculating such ratable deduction is the unit used in the industry and not a percentage. In the sand and gravel industry, of course, the ton is used as a unit.

The decision of the court proceeds to the conclusion that both lessor and lessee are entitled to a deduction from income equal to the exhaustion (depletion) occuring and that the allocation of such total amount is to be made in proportion to the interest of lessor and lessee.

No definite formula is provided for showing apportionment between lessor and lessee. Each case appears to rest upon the immediate circumstances and is not subject to any general rule regarding apportionment; but when lessor and lessee agree between themselves, the Commissioner of Internal Revenue is inclined to accept the apportionment as "equitable," unless some indication of tax evasion is present.

The following passage from the decision of the court explains the new doctrine regarding the depleting of leaseholds in income tax returns:

"It is said that the depletion allowance applies to the physical exhaustion of the ore deposits, and since the title thereto is in the lessor, he alone is entitled to make the deduction.

"But the fallacy in the syllogism is plain. The deduction for depletion in the case of mines is a special application of the general rule of the statute allowing a deduction for exhaustion of property. While lessee does not own the ore deposits, his right to mine and remove the ore and reduce it to possession and ownership is properly within the meaning of the general provision.

"Obviously, as the process goes on, this property interest of the lessee in the mines is lessened from year to year, as the owner's property interest in the same mines is likewise lessened. There is an exhaustion of property in the one case as in the other; and the extent of it, with the consequent deduction to be made, in each case is to be arrived at in the same way, namely, by determining the aggregate amount of depletion of the mines in which the several interests inhere, based upon the market value of the product, and allocating that amount in proportion to the interest of each severally considered."

It will be noted that the leases under consideration in this case involved the mining of iron ore. However, so far as income tax law is concerned, the principles laid down in this case apply with equal force to the production of sand and gravel.

It is impossible, in this brief article, to give a detailed analysis of the manner of taking depletion on leaseholds, for each case involves different circumstances and no general set of instructions can be given to sand and gravel producers for their use in taking advantage of this decision. The National Association will be glad to answer inquiries concerning this matter, and interested producers are invited to write for additional information.

An investigation has disclosed that many sand and gravel producers are uninformed as to the correct manner of setting up a depletion account in their income tax returns. Failure to set up this account means that there can be no intelligent checking of operating costs and actual cases which have come under the observation of the National Association indicate that producers are losing substantial sums of money yearly because they have neglected the question of depletion.—*National Sand and Gravel Bulletin.*

Fourth Annual Meeting of the Highway Research Board

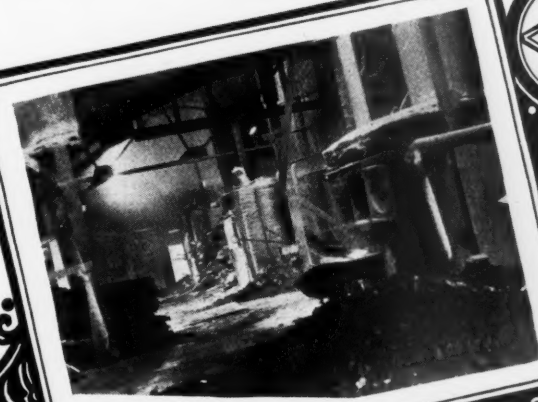
THIS is a report of the proceedings of the fourth of the annual meetings of the Highway Research Board of the National Research Council, which was held in Washington last December. It is edited by Charles M. Upham, director of the board, and H. F. Janda, assistant director. It contains 164 pages and is beautifully printed on tinted paper. Copies may be obtained from the board.

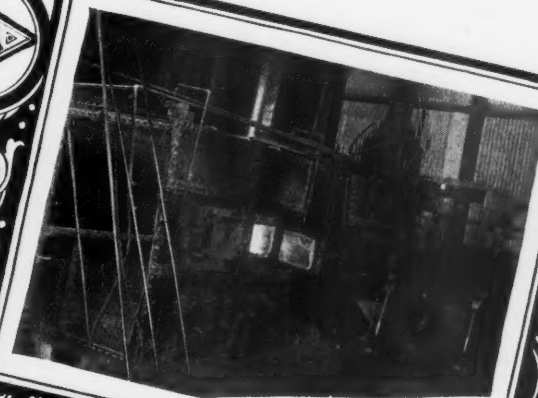
All of this report will be of interest to Rock Products readers although only a portion of it deals directly with aggregates and cement. Indirectly producers will be much interested in such facts as are given in the report of the committee on the economic theory of highway improvement. This is a very complete analysis of the cost of different types of roads taking into consideration the cost of operating vehicles over the different types and the density of traffic. In this way it is shown that the type of road which will be cheapest for 100 vehicles per day will be much more expensive for 1000 vehicles a day. Specifically, there is a saving of $318 a year in all costs of transportation, including the cost of the road, by using gravel instead of concrete for 100 vehicles a day, but there is a saving of $14,488 a year in all costs, including the cost of the road, by using concrete in the place of gravel for 2500 vehicles a day.

There are several excellent papers in the book, one of particular interest to makers of concrete highways being the paper by Prof. Hatt of Purdue University on the fatigue of concrete. Aggregate producers will be especially interested in a paper on the soundness test for gravel and stone, by Prof. Withey of the University of Wisconsin. A paper on the grading of aggregates by R. W. Crum of the Iowa State Highway Commission compares the theoretical work on the relation between the strength of concrete and the grading of the aggregates by different investigators including Feret, Fuller, Abrams, Edwards and Talbot. Everyone interested in aggregates and concrete will find this worth careful study. H. S. Mattimore of the Pennsylvania State Highway Commission has an important paper on the decrease of strength of concrete when wet and B. A. Anderton a progress report on the study of the grading of aggregates for sheet asphalt.

California Gravel Companies Combine

CONSOLIDATION of gravel plant industries in the valley is in order, with the announcement of the incorporation of Pelton and Levee, Inc., to take over the gravel crushing plants of the Pelton and Levee, Inc., and Reid-Platt, Inc., concerns of Los Angeles, Calif. The merger is said to represent interests involving $3,000,000.





A Real Advance in Kiln Firing!

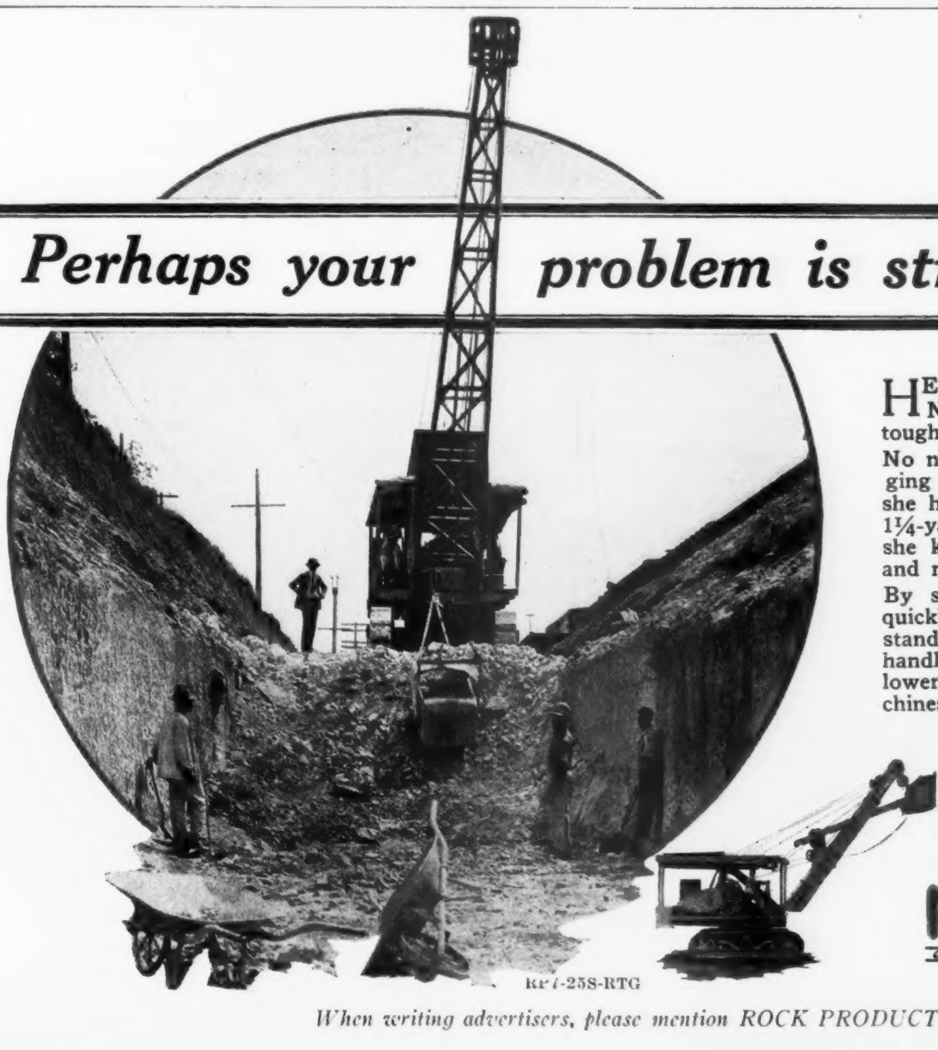
THE old lime producers may have been able to burn a good lime,—sometimes,—but the aboriginal equipment at their disposal hardly permitted the production of a uniformly and consistently perfect lime, in volume, at a low cost, every day of the year. Nowadays the producer, with all his experience, expert knowledge, and personal judgment, can take advantage of the modern Arnold Shaft Kiln and not only assure perfection of product, but efficiency and economy as well.

Take the firing floor of a kiln, for example. The old timer not only was a rotten housekeeper, according to the photograph above, but he did not have much to work with anyway. Compare those conditions with the view of the firing floor of the modern Arnold Kiln. Everything is simple, but well designed. The cleanliness alone speaks of efficiency. No wonder the modern producer can obtain a reliable product at a low cost!

For profitable kilns, consult our engineers.
Send for Information Today.

ARNOLD & WEIGEL :: Woodville, Ohio, U. S. A.

Perhaps your problem is stripping!



HERE is the kind of material a Northwest dragline will handle, tough stuff.

No need to be afraid of hard digging when you get up against it; she handles everything and with a 1¼-yard bucket on a 40-foot boom she keeps well ahead of the plant and machines in the pit.

By simply changing booms it is quickly converted to a ¾-yard standard shovel that is capable of handling your hardest work at a lower cost than your steam machines.

Northwest Engineering Company
1734 Steger Bldg., Chicago

NORTHWEST
GAS or CONVERTIBLE ELECTRIC
CRANES·SHOVELS·DRAGLINES

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News of All the Industry

Incorporations

Empire Quarry Co., Barre, Vt., $50,000.

J. W. Williams Slate Co., Montpelier, Vt., $100,000.

North East Concrete Products Co., Dover, Del., $1,500,000.

Midwest Portland Cement Co., Denver, Colo., $6,000,000; Ben Gibson, J. B. Gunn and W. G. Lewis.

Wilson Sand and Gravel Co., Huntington, W. Va., $1,000,000; C. R. Wilson, 1400 Fifth avenue.

Stuart Stone Co., Gosling, Fla., $25,000; W. C. Simmons and A. R. Wallace.

Fredonia Portland Cement Co., Dover, Del., $3,000,000. (United States Corporation Co.)

Lyman-Richey Sand Co., Omaha, Neb., has changed its name to the Lyman-Richey Sand and Gravel Co.

Southern Steel and Cement Co., Columbia, S. C., by Arthur N. Williams, 2204 Lee street, and others.

J. W. Stevens Roofing Tile Corporation, Dallas, Texas, $25,000; J. W. Stephens, 307 West 10th street, and others.

Maury Island Sand and Gravel Co., Everett, Wash., $20,000; H. P. Howard, T. G. Collings and James Chisholm.

Randolph Bush and S. M. Shultz are engaging in business at Monrovia, Calif., as the R. Bush Rock and Sand Co.

MacArthur Concrete Pile and Foundation Co., Inc., Indianapolis, Ind., filed certificate of withdrawal from state of Indiana.

Greenville Gravel Corporation, Greenville, Ohio, $10,000; R. H. Jamison, J. H. Kellogg, M. J. Brickman, N. B. Wilson and A. M. Berghoff.

Eastern Cast Stone Co., Malden, Mass., $100,000; Louis Adelson, Victor and Abraham S. Goldman, all of Boston. Contract awarded for $50,000 plant.

Rock Point Quarry Co., Nason, Ill., $25,000; David H. Miller, George H. and C. E. Anderson. (Correspondent, Gilbert, Gilbert and Gilbert, Gilbert building, Mt. Vernon, Ill.)

Preston Rock Co., Pasadena, Calif., $500,000; Geo. W. and Alice V. Preston and Fred C. Harris of South Pasadena, Walter S. McEachern and Della T. Neff of Pasadena.

Lakewales Concrete Sand Co., Lakeland, Polk county, Florida, $50,000 8% cumulative preferred stock and $200,000 common; officers and directors, A. F. Pickard, president; W. S. Dresser, vice-president; W. H. True, secretary; E. L. Mack, treasurer; W. R. Hannah, George S. Parker, E. E. Calloway, T. H. Burruss and Robert P. Thornton, directors.

Cement

Southwestern Portland Cement Co. has moved its temporary offices at Osborn to Dayton, Ohio, and all sales and advertising activities will now be directed from there.

Missouri Portland Cement Co., St. Louis, Mo., has purchased 160 acres of additional rock deposits near its Sugar Creek plant along the Santa Fe R. R., bringing its total holdings there up to about 400 acres.

Sand and Gravel

Los Angeles Rock and Gravel Co., Los Angeles, Calif., will expend about $1000 repairing the rock crusher tower at 3439 Pasadena avenue.

Port Crescent Sand and Fuel Co., Port Crescent, Mich., is reported to have added loading machinery costing $75,000 to its equipment at the operations described in Rock Products issue of June 27.

United Fuel and Supply Co., Detroit, Mich., has renewed its Fellowship in Highway Engineering at the University of Michigan for the year of 1925-26 for investigation of an approved subject relative to efficient methods of sampling gravel.

H. H. Hanankratt of Kansas City, Mo., has begun the operation of a new washed sand and gravel plant at Warsaw, Mo. The material is excavated by a ¾-yd. dragline and the plant has a capacity of 25 cars daily. E. H. Hayes is in charge of the work.

Cement Products

J. P. Cogburns, South Greenwood, S. C., plans to construct a plant to manufacture concrete sewer pipe.

Fayetteville Cast Stone Works, Fayetteville, Ark., has completed its plant at 14 East Lafayette street and are installing machinery. Output will be 200 to 800 concrete blocks daily.

Foley Brothers, St. Paul, Minn., have begun the manufacture of French and Spanish concrete roofing tile in the recently completed building at their plant in Darling, Minn. The capacity of this addition is 6000 tile per day.

Duntile and Cement Products Co., Baltimore, Md., is erecting and installing a cement products plant to cost $50,000 on White Marsh Run, Baltimore county. A. F. Bantro, 2501 Eastern avenue, Baltimore, is president of the company.

Fluorspar

Consolidated Mining and Smelting Co. of Canada is recabling the tramway between its mine and mill on Granby creek in the Grand Forks division of British Columbia and putting the mine and mill into condition for resuming operations. The plant when previously operated shipped the bulk of the output to Gary, Ind., where the fluorspar concentrate was used as a flux in the open-hearth furnaces. The Fordney tariff ended this business, resulting in the closing of the mine. It is understood that a contract has now been made with Ontario steel manufacturers to take the output of the plant, which amounts to between 5000 and 6000 tons of spar concentrate per year.

Lime

Standard White Lime Co., Guelph, Ont., plans to rebuild its plant recently damaged by fire by installing hydrating and transmission equipment and kilns.

Asbestos

Idaho-Montana Asbestos Co. is having engineers make a survey for rail connection for its asbestos deposit with the Union Pacific R. R. This deposit is located near the Idaho-Montana border, some 25 miles from West Yellowstone.

Paint Pigments

Sunbeam Mining and Refining Co., Sumner, Wash., plans to erect a new one-story plant for the manufacture of paint pigments and kindred products. It will cost $40,000 with equipment.

Personal

T. V. Buckwalter, who has been chief engineer for the Timken Roller Bearing Co., Canton, Ohio, was made vice-president in charge of engineering at the July meeting of the directors of the company.

Manufacturers

Barber-Greene Co., Aurora, Ill., has completed an addition to its office building for the use of the designing and engineering departments.

Dempsey Furnace Co., Jersey City, N. J., has consolidated with the W. N. Best Corporation, 11 Broadway, New York. The combined furnace business of the two companies will be operated as the Dempsey Furnace Division of the W. N. Best Corporation under the direction of H. B. Dempsey.

J' S. Mundy Hoisting Engine Co., Newark, N. J., has begun the erection af a new factory building at 722 Frelinghuysen avenue. This structure will be two-story, 40x140 ft.; the first floor will be used for a machine shop and the upper floor for the engineering, advertising and cost departments and pattern shop.

Bucyrus Co., South Milwaukee, Wis., announces the opening of a sales office at 461 Union Trust building, Pittsburgh, Penn., in charge of A. R. Hance, formerly Northwest sales manager. Mr. Hance, assisted by F. B. Smith, will handle the sale of Bucyrus equipment in Ohio, western New York, western Pennsylvania, western Maryland, West Virginia and eastern Kentucky.

The Dorr Co., Inc., New York, has had built a globe of the Earth, 4 ft. in diameter, so mounted that it may be revolved by a small motor. The fields to which Dorr equipment is applied are represented by different colored pins on the globe. More than 2000 pins are distributed through over 40 countries, giving a good idea of the application and distribution of the company's equipment. This globe was one of the features at the recent Chemical Equipment Exposition at Providence, R. I.

Gilman Manufacturing Co., East Boston, Mass., announces that the rock drilling contest recently held at the Imaim Amohalko fiesta at Miama, Okla., was won by the drilling team using a Gilman heavy drifter type of hammer rock drill. The team carried the machine the given distance, mounted it on the tripod and drilled a single hole through an 8-ft. block of concrete in four minutes and one second. A team using a Sullivan drill won second place by completing the work in four minutes and 34 seconds.

Trade Literature

Denver Rock Drill Manufacturing Co., Denver, Colo., has prepared bulletin No. 100-A, descriptive of its new Model 39 Waugh Turbro Stoper.

Fuller and Johnson Manufacturing Co., Madison, Wis., has prepared a new bulletin illustrating and describing Model "AB" two-cylinder engines.

Lewis-Shepard Co., Boston, Mass., has issued a pamphlet announcing its new type of lift truck platform and enumerating its important features.

Ideal Concrete Machinery Co., Cincinnati, Ohio, in its July issue of the "Idealist" features its vertical and roll-over strippers and products plant mixer.

Mead-Morrison Manufacturing Co., East Boston, Mass., has issued a new bulletin, No. 129, describing its electric car-puller and citing its many applications.

The Osgood Co., Marion, Ohio, has prepared a little booklet entitled "Service" telling of the manner in which its service department is conducted along with something of the history of Osgood shovel, crane and dragline manufacture.

National Council for Better Plastering, 819 Madison Square Bldg., Chicago, has issued a little booklet on "The Art of Better Plastering." It shows the importance of the plastering, the necessity of a reinforced base for the plaster and stresses the need for fire protection.

Shepard Electric Crane and Hoist Co., Montour Falls, N. Y., has issued an illustrated and descriptive catalog No. 84 with price list of its line of crane and derrick hoists, speed reducers, back-geared electric motors, industrial contractors and hauling winches.

W. B. Connor, Inc., New York, has issued catalog "A" which shows and describes in detail the design, construction and method of operation of the "Ace" Corliss valve steam trap. Copies furnished on request from the company at 223 West 33rd street, New York.

National Council for Better Plastering, Chicago, has published an interesting illustrated pamphlet, printed in two colors, describing the advantages and safety of proper plastering in home construction. It outlines points to watch to insure a better plastering job as advocated in the council's national campaign.

Vulcan Iron Works, Wilkes-Barre, Penn., has issued an eight-page bulletin No. 102 featuring its 16- and 20-ton gear driven gasoline locomotives. Complete specifications and general descriptions of these two sizes are included as well as hauling capacity charts along with several illustrations.

Raymond Bros. Impact Pulverizer Co., Chicago, has recently issued a pamphlet reporting the satisfactory results given by an installation of a Raymond four roller mill at the plant of the United States Sugar Co. of Madison, Wis., where it was used for pulverizing lime for sugar refinement.

Traylor Engineering and Manufacturing Co., Allentown, Penn., has issued a new bulletin No. 1099 pertaining to its jaw crushers. It describes and illustrates its Bulldog jaw crusher. It also includes tables and charts for use in determining sizes of screens and crushers suitable for definite services.

American Manufacturing and Engineering Co., Kalamazoo, Mich., has recently prepared and issued a new catalog of its line of cableway excavators. Factors affecting the efficiency of slack line excavators are discussed and the proper application of the different types of excavating equipment suggested.

S. Flory Manufacturing Co., Bangor, Penn., has prepared a new catalog No. 39 devoted exclusively to its gasoline hoists. It lists a line of standard hoists from 5 to 60 h.p. built in single, double and triple drum units, with or without swinging gears. General specifications and brief descriptions are given.

Hendrick Manufacturing Co., Carbondale, Penn., has issued a catalog of its line of perforated metals, elevator buckets, stacks, tanks, hoppers, etc. The book illustrates and describes fully the company's complete line of products and also offers considerable information which makes it valuable as a reference.

The Lunkenheimer Co., Cincinnati, Ohio, has prepared a bulletin describing and illustrating its new line of iron body, bronze-mounted gate valves which were released to the market on June 15. The different types are briefly and fully presented with specifications and price lists along with attractive three-color illustrations.

Link-Belt Co., Chicago, has issued a new book No. 540 on sand and gravel washing plants. A general discussion of washing and sizing sand

and gravel is first made, followed by illustrations and descriptions of typical Link-Belt plant layouts and equipment including screens, scrubbers, loading spouts, sand separators, drag line excavators, mast fittings, blocks and cables, belt conveyors, bucket elevators, etc. The latter part of the book is given to a number of typical sand and gravel plants showing the application of Link-Belt equipment.

Protexol Corporation, New York, successor Carbolineum Wood Preserving Co., has issued bulletin No. 40 presenting the value of brush or open tank treatments to prevent the decay of wood by the use of Protexol wood preservative No. 1. The bulletin is entitled, "The Annual Charge Against Treated Timber," and is a treatise on the economic aspects of timber treatments.

Link-Belt Co., Chicago, announces the publication of a new 68-page book describing methods for handling coal and ashes in boiler houses by the Peck carrier. This carrier is also used in handling cement, sand, ore and other materials. Among the illustrations is shown the installment in the boiler house of the new Tribune Tower in Chicago.

The Osgood Co., Marion, Ohio, has issued bulletin No. 256 featuring the Osgood ¾-yd. power shovel and its combinations. This recent addition to the company's line of shovels is full revolving, mounted on continuous treads and powered by gasoline or oil engines or electric motor and is convertible into a crane, clamshell or dragline excavator. Several of the details of its construction are presented and a table of the working ranges included.

Stearns Conveyor Co., Cleveland, Ohio, has issued a new bulletin entitled "Conveying and Storage Equipment to Conserve Dollars" in which is described and illustrated the company's latest design roller bearing troughing idler pulley, with high pressure grease lubrication; its new roller bearing return roller; the "Holotile" storage bin and the Stearns self propelled self reversing belt tripper. The company has also published an eight page folder descriptive of the Messiter conveyor scales for weighing material while on conveyor.

American Blower Co., Detroit, Mich., has issued a bulletin No. 3506 giving detail description and illustrations of its "ABC" steel plate exhaust fans, type "E." Tables are given of the various sizes of these fans showing results obtained from tests conducted in accordance with the provisions of the Standard Code for Exhausting Fans. There are also detail drawings of the fans with tables accompanying giving dimensions followed by a few pictorial presentations of typical installations. The company has also prepared a fine booklet, form No. 3118, on the "Venturafin" method of heating. The heating system is fully described and supplementary diagrams and illustrations of installations given.